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21 SEP 1959
FILE

Report of the Minister of Agriculture for Canada for the year ended March 31, 1958. —144 pp., 1958.

In the Plant Science section (pp. 17–45) of this report [cf. **35**, p. 156], some of the information in which has already been noticed, it is stated under Forest Investigations that the importance of root weevil injuries as the main infection points of root- and butt-rot decay fungi [unspecified] in immature balsam fir stands [*Abies balsamea*] had been established, and it was also found that many fungi associated with the deterioration of balsam fir were transferred from dead to dying trees by insect vectors. Seedlings of white spruce [*Picea glauca*] inoculated with the red root and butt-rot fungus [*Polyporus circinatus*: **35**, p. 601] died within 6–7 months. The fungus attacked the epidermis and cortex; in older trees (60–100 yr.) 37% of root inoculations caused infection, the wood being invaded by the fungus at 1·7–4·5 in./yr.

The activity of the auxin secreted by mycorrhiza into the roots of white and red pines [*Pinus strobus* and *P. resinosa*], changing their morphology and metabolism, was found to be determined by photo-assimilates other than sugars, and the surplus of sugars in the roots was not the only factor determining the establishment of mycorrhizal symbiosis.

White birch seedlings [*Betula papyrifera*] grown under conditions of controlled soil temp. and moisture tolerated temps. as high as 95° F., provided they had sufficient moisture supply. Reduction of soil moisture from 32 to 21% caused growth reduction of 65%, while reducing it to wilting point and below resulted in death. Maintaining soil temp. at 70° instead of 60° hastened the death of the seedlings under water stress by 26–39 days, and by varying soil moisture dieback symptoms could be reproduced [cf. **38**, p. 228].

Experiments on the effect of insecticides and fungicides indicated that although pelleted captan reduced forest tree seedling emergence by 12%, control of damping-off resulted in a stand of about 98% of that in the unpelleted beds, treated with insecticides in spring and autumn. The survey of young plantations of exotic tree spp. in British Columbia demonstrated that most of them were free from forest diseases.

Under Field Crops it is noted that in 166 collections of the common bunts [*Tilletia* spp.] from S. Alberta, tested on differential hosts of spring and winter wheats, 7 races were identified. During longevity tests on loose smut [*Ustilago nuda*] a few spores were found alive in collections stored for about 10½ yr., while mycelium in seed stored for 6 yr. was alive and smut resulted.

The barley scald fungus [*Rhynchosporium secalis*: cf. **37**, p. 205], which overwinters on barley debris, in the soil, and on the seed, did not affect wheat, rye oats, flax, or forage crops [cf. **38**, p. 140]. Foliage diseases of barley in Manitoba and Alberta caused losses of 4–25% (av. 12%), the annual losses for the Prairie Provinces being estimated at 25 million bushels.

A study of cultural and rotational practices showed that conditions most favourable for maize production, i.e. the addition of fertilizer to the rotation in which legumes occurred most frequently, was also most conducive to stalk rot [unspecified: **38**, p. 366].

The development is reported from S. Alberta of 5 new synthetic vars. of alfalfa resistant to bacterial wilt [*Corynebacterium insidiosum*: cf. **35**, p. 896]; none of the present flax vars. are resistant to aster yellow virus [cf. **37**, p. 710], although some highly resistant sunflower vars. are known [**37**, p. 549].

Considerable variation in the degree of field resistance to *Phytopthora infestans*

was noted in potato vars.; a few Canadian potato selections from hybrids of the common and wild spp. survived after a season of exposure to blight under most severe conditions in Mexico. Treatment against blight gave the following results (yield in bushels/acre): experimental mixture (maneb and a fixed Cu) 414·0, maneb 408·5, Bordeaux 382·4, and unsprayed 231·4. All 14 potato vars. screened in Prince Edward Island for resistance to *Verticillium* wilt [**37**, p. 370] were highly susceptible except Green Mountain which was shown to be moderately resistant. Of the tubers from wilted hills of 10 vars. treated with semesan bel and planted in non-contaminated soil, only Merrimack, Saco, and Keswick gave a low percentage of tuber transmission. Black leg of potato [*Erwinia carotovora*: **35**, p. 159] was best controlled with a combination of semesan bel and streptomycin (2·7% infection), and when black leg and *Verticillium* wilt occurred simultaneously, treating the seed with semesan bel reduced black leg to 1%. Bacterial ring rot [*Corynebacterium sepedonicum*; cf. **37**, p. 516] was best controlled by dipping potato setts for 10 min. in acidulated mercuric chloride (6 oz. $HgCl_2$/25 gal.+1 qt. 31% HCl.). An early and a late selected line of Irish Cobbler were derived, respectively, from healthy appearing greenhouse plants infected with a mild strain of potato virus X and from mottled greenhouse plants infected with a severe strain of this virus; in the field the late type produced a more vigorous vine growth and more profuse blossom, showing no original mottle; both produced equal yields when harvested 90 days after planting, though the late type gave a bigger yield when harvested on the 110th day. It was demonstrated that a type of purple top disease of potatoes was due to a virus that corresponded more closely to tomato big bud than to aster yellows virus [cf. **38**, p. 95]. It was found in the field on marigolds [*Tagetes* and *Calendula*], rutabaga [swede], tomato, petunia, wild radish, milkweed [*Asclepias syriaca*], and red clover, the last 3 probably acting as sources of infection of potatoes. It was also observed that [potato] virus F [str. of potato aucuba mosaic virus] can cause a rugose type of mosaic when in combination with potato virus X; some forms of virus F also caused internal damage to tubers.

Under Vegetable and Root Crops is noted the 1st record of tobacco necrosis virus in Canada, from Ontario, where it was isolated from roots of cucumbers and muskmelons grown in greenhouse compost soil. A new soil-borne virus named cucumber necrosis virus systemically infected a small percentage of cucumber plants via the roots; further spread occurred from handling of plants. Another virus, tentatively identified as one of the tomato ringspot group, occurred in 2 strains, one of which was highly lethal to cucumbers.

Under Fruit Crops mention is made of the new fungicides tested against apple scab [*Venturia inaequalis*]. Cyprex [cf. **37**, p. 540] and dyrene [**37**, p. 244] gave excellent control, although the latter was phytotoxic and caused severe russetting. Zineb was effective as a cover spray for the control of late season scab; study of Hg residues on apples indicated appreciable amounts 42 and 69 days after spraying. In Quebec good control of scab was obtained with captan and glyodin, though both produced shortened shoots and smaller yields over a 3 yr. period; thioneb and niacide were also effective.

Heavy and widespread infection of plum trees in Nova Scotia by black knot [*Dibotryon morbosum*: cf. **37**, p. 156] occurred following the appearance of a highly virulent strain of the fungus; the form of the fungus on peach was morphologically similar to that on plum. Sulphur and Bordeaux mixture sprays, along with orchard sanitation, failed to control the disease.

Studies of stone fruit viruses demonstrated that a strain of [peach] necrotic ring spot virus had antigenic properties in common with other strains of this virus, and with strains of the cherry [sour] yellows virus, though the 2 viruses differed in stability during purification, in particle size, and in biologic reaction. Lloyd George raspberries in British Columbia were infected with black raspberry necrosis

virus [cf. **36**, p. 198] (also found on other red raspberry vars. as a latent or semi-latent virus) and raspberry vein chlorosis virus [cf. **31**, p. 614]. The former was heat labile, while the latter withstood 100° F. for 5 weeks. Transmission was by the large and a small raspberry aphid, respectively; the latter aphid was only found on var. Lloyd George, to which the vein chlorosis was restricted.

A highly pathogenic strain of the strawberry leaf spot fungus [*Mycosphaerella fragariae*] isolated from the Early-bird selection grown in Ottawa could cause severe infection in vars. Premier, Fairfax, and Klonmore, hitherto resistant. All the commercial vars. of strawberry grown in British Columbia and 7 wild spp. proved susceptible to *Verticillium* wilt [**37**, p. 729], though Climax and Marshall were somewhat tolerant, and a Californian var., Sierra, was entirely resistant. Investigations of the virus diseases of strawberries indicated that viruses which are latent in British Sovereign have little effect on the plants' vigour when they occur singly, but when in certain combinations they reduced it considerably.

Under Ornamental Plants it is noted that dust or spray applications of karathane WD were effective in controlling powdery mildew [*Erysiphe cichoracearum*: **35**, p. 876] on begonia. Black spot of roses [*Diplocarpon rosae*: cf. **38**, p. 8] was controlled by micronized captan and phaltan [**37**, p. 620], while organic Hg fungicides proved phytotoxic. Captan and PCNB were both effective against *Rhizoctonia* on antirrhinum at a soil temp. below 20° C., at 20° only PCNB was effective, and above that neither. Tulip measles, causing severe losses in 1957 in the cut flower trade, was caused by the germination of spores of 2 grey mould organisms [unspecified], present on the foliage and petals during cutting. An outbreak may be prevented by removing plants with primary infection, while a thiram spray acts as a protectant.

Investigation of the part played by Mn in the oxidative decomposition of dithiocarbamate fungicides, such as nabam and zineb, which yield the active component ethylene thiuram monosulphide, indicated that only a trace of $MnSO_4$ was necessary to catalyse the reaction, provided the spray was not too acid. This accounts for the superiority of maneb over other metallic ethylene bisdithiocarbamates [**36,** p. 453].

In the Soil Science section of this report, under Microbiology (pp. 46–48), it is stated that more wheat seed bacteria required 1 or more growth factors than wheat rhizosphere bacteria, especially vitamins, in particular pantothenic acid. On the other hand more rhizosphere bacteria could synthesize growth factors than seed bacteria. Rhizosphere studies [**37**, p. 470] revealed the great quantitative and qualitative effect of roots on the soil bacteria even at a very early stage. The number of bacteria in the rhizosphere increased 3-fold 3 days after planting wheat seeds, and after 7 days it reached the peak value (5-fold); the amino-acid-requiring and ammonifying bacteria were preferentially stimulated; the root population was also physiologically more active by the 7th day; all these changes continued as the plant aged and sometimes even became exaggerated. The same marked stimulation by plant roots was exerted on soil fungi [cf. **37**, p. 523], which increasingly colonized plant roots as they grew; some specific fungi, rare in soil, became predominant on the roots. Penicillia and other spp. abundant on roots at the initial stage disappeared later. The number of fungi in the vicinity of roots also increased with plant age, but was dependent on the soil type.

Plant Pathology Division.—*Res. & exp. Rec. Minist. Agric. N. Ireland,* **7** (*1957*), pp. 210–231, 1958.

In this report [cf. **37**, p. 324] it is noted that neither N nor P had any effect on the incidence of leaf spot and seedling blight of oats (*Pyrenophora avenae*), but it was lower on plants supplied with K. *Cercosporella herpotrichoides, Corticium solani,*

and in many cases *Fusarium avenaceum*, *F. culmorum*, and *F. nivale* [*Calonectria nivalis*] were involved in an outbreak of disease in the wheat vars. Koga II (most affected), Atle, Atson, and Svenno, which occurred just before harvest in mid-Sept. and appeared to be associated with prevailing wet weather.

In the annual seed tests the contamination of oats by *Fusarium* spp. [**37**, pp. 352, 532] was 15·1% (highest since the survey began) and 21·1% for barley (mainly *F. avenaceum*).

Further study was made of the physiologic specialization of *Phytophthora infestans* [**37**, p. 3], which was occasionally severe on Ulster Torch potato, hitherto regarded as distinctly resistant; from 7 samples of affected tubers race 1, 4 was isolated.

Considerable spread of potato virus Y [**37**, p. 325] at the Field Station in 1956 approximated to that recorded for 1955, especially in Arran Pilot. Results from the Moy area confirm those of 1956, and indicate that the danger of infection by virus Y in this area is remote if fresh stocks of 'seed' are used each year. The work on varietal reaction to infection by virus Y was continued, the 1st year symptoms induced by grafting being in agreement with the 1956 results; attention is drawn to the fact that mild reaction in some new vars., such as Dr McIntosh, Ulster Chieftain, Ulster Dale, and Ulster Cromlech can be overlooked in the field, or recorded as a mild virus X infection. Estimation of the spread of virus Y by recording the number of plants exhibiting symptoms in the 1st year was not found completely satisfactory.

In 1957, leaf samples of 29 potato vars., most of which are widely grown for seed tuber production, were tested for potato virus S [str. of potato paracrinkle virus] by the agglutination method [**37**, p. 325]. The percentage infection in the older established vars. was lower than anticipated and the newer vars. were free from infection; thus the building up of virus-free stocks should be possible. Of 60 samples of Arran Pilot, 56 were positive. The results of the survey largely agree with those obtained in the previous years. The results from serological testing for potato virus X stress the advantage of using expressed sap instead of leaf samples when testing is delayed, and show that positive results can be obtained after a much longer storage period when tobacco is used as host instead of potato.

Of 21 potato seedling vars. tested for reaction to potato viruses X [and its strains], B [**37**, p. 301], and C, and virus A 1 was field immune from all; 16 were field immune from 1 or more; 13 possessed field immunity from X, 11 from A, 10 from B, and 6 from C.

Experiments indicated that incidence of stem-break of flax (*Polyspora lini*) increased with air humidity but was little affected by temp. Approx. 23° C. is recommended for greenhouse tests of flax resistance to *Colletotrichum linicola*, but lower temps., in the open, for similar tests with *Phoma* sp.; a survey of breeding tests indicates that plants homozygous for resistance to stem-break have been found. In 1 pot test the incidence of seedling blight (*C. linicola*) in Stormont Gossamer was not influenced by nutrition, but attacks of foot rot (*Phoma* sp.) were lowest when the P content was low and that of N high.

Powdered manzate applied to dibble holes in the field was as efficient as 0·1% $HgCl_2$ (250 ml.) in controlling club root (*Plasmodiophora brassicae*) of cauliflower, but at higher rates it reduced growth rate and yield. Thiram powder was less effective but did not lower yield. Only the highest dosage of ammonium sulphate reduced the club root disease index of brassicas inoculated with high spore load, and it was higher in the absence of N than in the presence of the highest fertilizer rate; the effects of P and K (index for both usually higher) were much less marked than that of N, and were not altered by spore load, in contrast to the more marked effect of N at low spore loads.

The results obtained in further tests with 8 sprays against rose rust [*Phragmidium mucronatum*], expressed as means of the indices for 4 vars., were as follows: fermate +spersul 4·1, fermate 5·2, oil-Bordeaux in Apr. and May followed by fernide (80%

thiram) from June onwards 6·2, obetan 11·9, fernide 14·2, spersul 21·5, fernide alternating with captan 25·3, captan 57·6, unsprayed plots 85·4 and 87·4 (range 81·8–91·5). Leaf retention was satisfactory with the 1st three.

Intensive roguing of chrysanthemum stocks produced a high percentage of plants free from [tomato] aspermy virus. Young bushes of *Pyracantha* were heavily infected by *Fusicladium pirinum* var. *pyracanthae* [cf. **37**, p. 45]; *Chrysomyxa rhododendri* [**36**, p. 79] was detected on *Rhododendron* vars. at 2 centres.

Cluster cup rust (*Puccinia pringsheimiana*) [**37**, p. 4] was epidemic [on currants and gooseberries] in areas where the sedge meadow pasture type predominates.

Heavy infection by *Corticium solani* on tomato seedlings raised in compost containing unsterilized grit contaminated with top soil is noted; specimens of tomato 'brown pith necrosis' [**37**, p. 4], a recently named bacterial disease, were received from several districts. Serious losses of both self-blanching and trench celery were due to *Sclerotinia sclerotiorum* [cf. **35**, p. 808].

Plantesygdomme i Danmark 1956. Årsoversigt samlet ved Statens plantepatologiske Forsøg, Lyngby. [Plant diseases in Denmark 1956. Annual report compiled by the State Phytopathological Experiment Station, Lyngby.]—*Tidsskr. Planteavl*, **62**, 4, pp. 553–614, 1 fig., 2 graphs, 1958. [English summary.]

Prepared on the usual lines, this report [cf. **37**, p. 441] includes contributions by O. Wagn, M. H. Dahl, H. R. Kristensen, & H. A. Jørgensen. Among physiological disorders, Mn deficiency of summer cereals, mangolds, and beets was unusually prevalent, especially in soils loosened and aerated by heavy mechanical treatment. Cracks round the blossom end of var. Ingrid Marie apples were very common, particularly on well-coloured fruits near the periphery of the trees.

Potato wart disease (*Synchytrium endobioticum*) was reported from 2 new municipalities.

Botrytis allii was so virulent on stored onions during the autumn that many growers resorted to artificial drying at the Experiment Station's request. The outdoor tomato crop was a failure on account of infection by *Phytophthora infestans*.

Among new records for Denmark was a virosis of plums resembling bark split [**35**, p. 875] and one of cherries similar to rusty mottle; strawberry crinkle and green petal [**35**, p. 467] viruses; cucumber green mottle mosaic virus widespread in greenhouses, and a strain of tobacco necrosis virus in symptomless cucumber leaves believed to be related to or identical with that causing 'Augusta disease' of tulips [**34**, p. 576 *et passim*]; tobacco necrosis virus in *Anemone coronaria*; and cucumber mosaic virus in *Ajuga reptans*, gladiolus, and *Primula moerheimi*.

The following fungi were observed for the 1st time: *Ustilago nigra* (in 1949 in an international barley assortment); *Mycosphaerella citrullina* on melon; *Peronospora iberidis* on *Iberis coronaria*; and *Phialophora* [*Verticillium*] *cinerescens* on carnation [cf. **36**, p. 415 *et passim*]. *Pectobacterium parthenii* var. *dianthicola* [**37**, p. 481] attacks the xylem of carnations causing a brown discoloration of the stem. It is disseminated by infected cuttings or planting healthy material in contaminated soil. Young walnut fruits were destroyed in 1954 by *Xanthomonas juglandis* [map 133], also new to the country.

Tröger (R.). **Studien zur Fungicidwirkung der Schwermetallsalze.** [Studies on the fungicidal action of heavy metallic salts.]—*Arch. Mikrobiol.*, **29**, 4, pp. 430–437, 1 fig., 1958.

In further experiments [cf. **38**, p. 181] conidia of *Fusarium decemcellulare* [*Calonectria rigidiuscula*] were treated for 5 hr. with solutions of various metallic salts, the conc. of the metal being 5 μg./ml. Salts of Cu, W, Cr, Ni, Zn, Hg, Ag, and U caused the conidia to release amino-acids, which were separated and identified by paper chromatography.

GUPTA (J. S.). **Laboratory assay of certain fungicides, antibiotics and sulpha-drugs on the germination of chlamydospores of Protomyces macrosporus Ung.**—*Agra Univ. J. Res. (Sci.)*, **7**, 1, pp. 105–111, 1 fig., 2 graphs, 1958.

At Agra College, India, germination was tested by a modification of the Rideal Walker method, as described by McCallan [cf. **27**, p. 435]. Sulphathiazole and sulphadiazine (250–1,000 p.p.m.) effectively inhibited germination; streptomycin, agrosan, and perenox (at the same rates) inhibited it almost entirely, while penicillin was effective only at 1,000 p.p.m. *P. macrosporus* caused a 15% loss of coriander fruits at Gwalior.

MUNNECKE (D. E.), LUDWIG (F. A.), & SAMPSON (R. E.). **The fungicidal activity of methyl bromide.**—*Canad. J. Bot.*, **37**, 1, pp. 51–58, 5 graphs, 1959.

An earlier method of using spores of *Alternaria solani* to assay antifungal activity [**35**, p. 470] was modified by exposing the spores to methyl bromide on glass fibre disks, subsequent germination in 0·05% orange juice being evaluated after staining with fast green in lactophenol. The results obtained by direct mortality counts yielded linear probit-log dose regression lines, and the effectiveness of the fumigant was found to depend on the vapour pressure of humidity in the atmosphere independently of temp.; humidity appears to operate by its effect on spore hydration.

OWENS (R. G.) & NOVOTNY (HELEN M.). **Mechanism of action of the fungicide dichlone (2,3-dichloro-1,4-naphthoquinone).**—*Contr. Boyce Thompson Inst.*, **19**, 6, pp. 463–482, 10 graphs, 1958. [21 ref.]

Dichlone [cf. **37**, p. 335] accelerated endogenous respiration of *Neurospora sitophila* conidia in much the same way as the classic phosphorylation-uncoupling agent 2,4-dinitrophenol. Data indicated that its toxicity could be attributed to concomitant inhibition of phosphorylation, certain dehydrogenases and carboxylases, and inactivation of coenzyme A.

VOLGER (C.). **Ein systemischer Effekt des fungiziden Wirkstoffes TMTD.** [A systemic effect of the fungicidal active substance TMTD.]—*Naturwissenschaften*, **46**, 4, pp. 148–149, 1 fig., 1959.

At the Institut für Waldbau-Technik, University of Göttingen, Germany, conifer seeds treated with thiram [**37**, p. 743] or untreated were germinated on moist blotting paper in Petri dishes. After removal of the testa (the only part to come into contact with the fungicide) sap was extracted and dropped into marked circles on agar plates of *Botrytis cinerea*. The sap from treated seeds exerted a fungicidal action.

AVIZOHAR-HERSHENZON (ZEHARA) & PALTI (J.). **Small scale fumigation trials for the control of Sclerotium rolfsii.**—*Ktavim (Rec. agric. Res. Sta. Rehovot, Israel)*, **9**, 1–2, pp. 147–151, 1 fig., 1958.

Satisfactory kill of sclerotia of *S. rolfsii*, inoculated in the soil and on the surface, was obtained by injecting CBP (chloro-bromo-propene) 55 at 100 l./dunam (approx. ¼ acre) to a depth of 5 cm. twice at an 8-day interval [cf. **37**, p. 146]. Application at the same rate by flooding [cf. **34**, p. 190] was less satisfactory, an adequate kill of sclerotia being achieved only when 200 l. were applied in a single treatment. These treatments, however, were too costly to be economic in Israel. Two other materials tested were inadequate.

WOOLLEY (D. W.). **Antimetabolites.**—*Science*, **129**, 3349, pp. 615–621, 1959.

In spite of its medical bias, this lucid review should prove of interest to plant pathologists concerned with chemotherapy. The mode of action of antimetabolites

is clearly explained, and examples are given to illustrate their possible uses in elucidating physiological reactions or in blocking specific processes in a pathogen.

Bonner (D. M.). **Aspects of mycological research in Japan.**—*Trans. N.Y. Acad. Sci.*, Ser. ii, **21**, 2, pp. 146–152, 1958.

This interesting survey and discussion is concerned mainly with the application of mycological studies to various industrial procedures, including the use of Aspergilli in fermentation, saccharification, and the manufacture of soya sauce and paste, and the production of monosodium glutamate from *Micrococcus glutamicus* and other bacteria. Outstanding progress has also been made in studies on the physiology and taxonomy of *Aspergillus*, while research is proceeding on the genetics of the 2 koji moulds, *A. oryzae* and *A. sojae*, in order to promote their industrial exploitation. Great interest has also been evinced during recent years in the study of antibiotics.

Leather fungicides.—*Leath. Mfr*, **75**, 7, p. 10, 1958. [Abs. in *J. Amer. Leath. Chem. Ass.*, **54**, 3, p. 177, 1959.]

Studies by the [U.S.] National Bureau of Standards on hundreds of fungicides were concerned with the factors essential for efficiency, deterioration of certain products and its effects on leather, and the manner in which substituents in certain organic compounds increase or decrease their fungitoxicity. Preliminary trials with bis(4-nitrophenyl)carbonate and bis(2-chloro-4-nitrophenyl)carbonate gave excellent results.

Inouye (Y.), Iizuka (Y.), & Tazima (T.). **Studies on leather fungi. I. Morphology and enzyme activity of the leather fungi. II. Selection of the test strains and the antifungal action of phenolic compounds. III. The antifungal activities of organic mercury compounds.**—*Bull. Jap. Ass. Leath. Tech.*, **3**, pp. 95–100, 167–177, 1957; **4**, pp. 163–168, 1958. [Japanese, with English summaries. Abs. in *J. Amer. Leath. Chem. Ass.*, **53**, 4, p. 225, 1958; **54**, 1, p. 55, 1959.]

Of 64 spp. isolated from skins and leather materials, 35 grew on a medium containing added keratose, viz., *Aspergillus niger*, *A. candidus*, and 14 other *A.* spp. [cf. **36**, p. 488], 15 spp. of *Penicillium*, 1 of *Citromyces*, and 3 unidentified. Some strains exerted a very powerful enzymatic action (protease, lipase, and tannase).

Spores of 10 mould strains from leather were used to study the fungicidal properties of the chlorophenols and 4-nitrophenol in a liquid medium and found to be more resistant than *A. niger*. The efficiency of the chlorophenols increased with the number of Cl atoms, and for those with the same number the presence of a 4-Cl enhanced the activity. Comparable results were obtained with vegetable-tanned horse leather inoculated with these spores, but the quantities of fungicides required for inhibition of growth were about 10 times as great as in the liquid medium. Tests were also made with nitro-hydroxy-diphenyl, phenyl phenol, *sec*-amylphenol, and chloro-hydroxy-diphenyl, of which the last-named was as effective as CCl_5OH.

In Czapek-Dox liquid medium the inhibiting conc. for fungal contaminants of leather were computed for phenyl mercuric formate, acetate, propionate, butyrate, valerianate, and capronate, and for 4 alkoxy HgCl compounds (methoxy, ethoxy, propionoxy, and butyroxy). They averaged 1:200,000 as against 1:15,000 for Na pentachlorophenol. Vegetable-tanned leather strips were treated with saturated and 1:50,000 solutions of these compounds and placed in a weather-o-meter for 6 months. All the saturated solutions retained their efficacy for 6 months, but of the 1:50,000 treatments only phenyl mercuric propionate, propionoxy HgCl, and butyroxy HgC were still active. It was concluded from further calculations that fungicidal efficiency increases with surface tension and decreases with rate of hydrolysis. In general, the alkoxy Hg compounds are superior to the phenyl mercuric.

Barnett (H. L.) & Lilly (V. G.). **Parasitism of Calcarisporium parasiticum on species of Physalospora and related fungi.**—*Bull. W. Va agric. Exp. Sta.* 420T, 37 pp., 36 fig., 1 diag., 10 graphs, 1958. [23 ref.]

It is reported that the susceptibility of certain fungus hosts to *C. parasiticum* [**38**, p. 133] varied somewhat according to the medium on which they were grown. The spores of *C. parasiticum* failed to germinate in distilled water, or on water agar; but germinated rapidly on medium containing natural products from various sources or from a living host mycelium, germination being followed by production of secondary spores. Any further development occurred only in the presence of a living host or the extract of the mycelium of certain fungi. The parasite does not penetrate the host cells, but establishes a compatible nutritional relationship with the latter via a small cell at the tip of the parasitic hypha. The only harmful effect produced on the host is the reduction in growth rate and possibly an increased rate of autolysis. When grown on glucose yeast extract agar supplemented by the host extract, *C. parasiticum* produces yeast-like sprouting growth, though in one of these cultures a mutant growth with profuse mycelium and fewer spores than the parent was produced. A relatively high conc. of amino acid in an agar medium supplemented by host extract favoured the growth of both the parent and the mutant in the absence of the living host. *C. parasiticum* is an excellent test fungus for more intensive studies on the balanced type of parasitism.

Juniper (B. E.). **The surfaces of plants.**—*Endeavour*, **18**, 69, pp. 20–25, 4 pl. (24 fig.), 1959.

Study of the behaviour of liquids on leaves was furthered by examination of negative moulds of the leaf surface, made with evaporated C (*Brit. J. appl. Phys.*, **5**, p. 65, 1954), under the electron microscope. This revealed minute projections, assumed to be of wax, from the surface of the cuticle in many plants. The projections varied extensively in form with different spp., and their appearance may be changed by environmental conditions. Their development indicates a continuous passage of substances through the cuticular layers during the life of the leaf and their occurrence accounts for the high contact angles (above 105°) observed between solids and the liquid-air surfaces of leaves, and thus has considerable bearing on the efficiency of chemicals applied to leaves.

Durbin (R. D.). **Factors affecting the vertical distribution of Rhizoctonia solani with special reference to CO_2 concentration.**—*Amer. J. Bot.*, **46**, 1, pp. 22–25, 1 fig., 1959.

At the University of California, Berkeley, 33 clones of *R.* [*Corticium*] *solani* [see below], isolated from various hosts and classified as 'aerial', 'surface', and 'subterranean' according to whether the aerial parts, crown, or roots were attacked, were grown in U-tubes in flowing atmospheres with various levels of CO_2, and their linear growth rates were compared with those in air. Clones isolated from the soil [cf. **22**, p. 449] were more tolerant of CO_2, having this attribute in common with fungi normally found in the soil. In a study of 86 clones the ratio of the mean linear growth rates for the 3 types was 4:3:2. Linear growth rate and CO_2 tolerance were negatively correlated while the percentages of the 3 types producing sclerotia were 82, 48, and 21, respectively: these 3 factors are concerned in determining the habitat of the clones. In 9 clones linear growth was not correlated with endogenous O uptake.

Durbin (R. D.). **Some effects of light on the growth and morphology of Rhizoctonia solani.**—*Phytopathology*, **49**, 1, pp. 59–60, 1 graph, 1959.

At the University of California, Los Angeles, some clones of *R.* [*Corticium*] *solani* [cf. above] formed sclerotia in response to light (200 ft. c. Sylvania 'cool white

standard' fluorescent lights), while others did not, in flasks of liquid Czapek's medium, incubated for 1 week. Continuous light or darkness caused little difference in the linear growth [cf. above], but mycelial dry wt. (1 week in liquid Czapek) of 7 clones was significantly increased in darkness. With light periods of 1–24 hr./day, the log. dry wt. was negatively correlated with the no. of light hr. The reason is uncertain, but apparently lateral hyphae develop less well when exposed to light, though terminal hyphae are unaffected.

Sclerotia were produced by $\frac{1}{4}$ of the isolates only in light and by $\frac{1}{2}$ under both conditions, but under continuous light they were usually more appressed and compact, with lighter pigmentation.

Bega (R. V.). **The capacity and period of maximum production of sporidia in Cronartium ribicola.**—*Phytopathology*, **49**, 1, pp. 54–57, 1 fig., 1959.

At the University of California, Berkeley, the production of sporidia of *C. ribicola* [cf. **36**, p. 147; **37**, p. 121] by telia formed on inoculated plants of *Ribes aureum* and *R. nevadense* was measured quantitatively. Telial columns were attached basally to water agar blocks and fixed inside Petri dish lids so that the column tips were not more than 1 mm. from the agar surface, which ensured maintenance of 100% humidity round the columns. The pH of this (water) agar was adjusted to 2 to prevent germination of the primary sporidia falling on it. The Petri dish was placed on the top of the clock drum of a Friez hygrothermograph with its lid slightly raised on 4 pegs placed round the drum; thus the lid remained stationary while the bottom revolved. Spore counts were made under a dissecting microscope, the dish being placed on a circle of tracing linen radially divided into zones corresponding to the time intervals on the hygrothermograph chart.

Telial columns were formed in the greenhouse at 16 or 20° C. and in the open (on *R. aureum*) at 10–27° day and 5–14° night temp. A typical telial column from *R. aureum* at 16°, $1,330 \times 105\,\mu$, and 10 days old, cast 4,930 sporidia, starting $8\frac{1}{2}$ hr. after subjection to 100% humidity. Production was at a peak after 14 hr., continued thus to the 45th hr., and ceased after 70 hr. A column $770 \times 73{\cdot}6\,\mu$, 7–9 days old, from *R. aureum* in the open cast 2,954 sporidia, starting during the 7th hr., with peak production at 11–30 hr., and cessation after 43 hr. at 100% humidity. Variations in production of sporidia were mainly related to size and age of the telial column. Artificial light had no effect on germination of teliospores or sporidial discharge.

Kuzyurina (Mme L. A.). Об устойчивости конидий **Aspergillus nidulans** и **Aspergillus niger** к ультрафиолетовым лучам. [On the resistance of conidia of *A. nidulans* and *A. niger* to ultra-violet rays.] –*Microbiology, Moscow*, **28**, 1, pp. 38–44, 1 graph, 1959. [English summary.]

At the Microbiological Institute, Moscow, U.S.S.R., there was a decrease in the number of surviving conidia as the ultra-violet dose was increased; 10% of those of *A. nidulans* were killed by $2{\cdot}4 \times 10^{-3}$ erg/area equalling 1 conidium, while 96×10^{-3} erg/conidium caused 99·5% mortality. In contrast *A. niger* required 8×10^{-3} erg/conidium for 8·8% mortality and 145×10^{-3} for 99·6%.

Postlethwait (S. N.) & Curtis (R. W.). **Histology of malformations produced on Bean plants by culture filtrate of Aspergillus niger.**—*Amer. J. Bot.*, **46**, 1, pp. 31–35, 12 fig., 1959.

This is a more detailed account of work already noticed [**38**, p. 129]. The malformations described seem to result from a partial loss of polarity in the cells of the actively growing region of young internodes and petioles of *Phaseolus vulgaris* var. Black Valentine, such that enlargement and multiplication of the cells in the affected parts occur mostly at an angle to the longitudinal axis of the plant. The

effect is a localized one, and tissues produced by the apical meristem subsequent to treatment develop normally.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, **7**, 1, pp. 15–16, 1958.

The Plant, Fruits, and Vegetables (Importation) (Amendment) Regulation of 1 Aug. 1958, published as Statutory Instrument No. 34 of 1958, prohibits the importation of any citrus plant, coconut plant, or any plant or seed of the mahogany family from Trinidad into British Honduras.

Law No. 4990 of 28 Aug. 1958 (published in *El Caribe*, 31 Aug. 1958) regulates the importation of plant material into the Dominican Republic.

Proclamation No. 88 (Union of South Africa), of 28 Mar. 1958 (published in the *Govt. Gaz.* No. 6045, 11 Apr. 1958) declared seed of the rice plant (including all unhusked rice and seed rice) to be a plant for the purpose of the Agricultural Pest Act, 1957 [cf. **37**, p. 334]. Proclamation No. 89 prohibits the importation into the Union of S. Africa of seed of the rice plant or seed rice from Cuba, Panama, Venezuela, or any other country where 'hoja blanca' disease [map 359] is present.

Égliте (A. K.). Труднорастворимые минералы и органические вещества в качестве источника питания микоризных грибов. [Barely soluble minerals and organic substances as sources of nutriment for mycorrhiza forming fungi.]—Тр. Ин-та микробиол. А. Н. Латв. ССР [*Trud. Inst. Microbiol. Acad. Sci., Latv. SSR*], *1958*, 7, pp. 65–75, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 5, p. 122, 1959.]

When *Boletus bovinus*, *B. granulatus*, and *B. variegatus* [cf. **37**, p. 452] were cultured on synthetic media, they were able to use P from Ca_3 $(PO_4)_2$, Fe_3 $(PO_4)_2$, nucleic acid, and phytin, K from mica and barely soluble silicate gravel, and N from peptone nucleic acid and the ammonium sulphate of phytin. They could also obtain P and N from fallen pine needles.

Jürgens (C.). **Physiologische und genetische Untersuchungen über die Fruchtkörperbildung bei Schizophyllum commune.** [Physiological and genetic studies on fruit body formation in *S. commune*.]—*Arch. Mikrobiol.*, **31**, 2, pp. 388–421, 7 fig., 1 graph, 1958.

The material used in these studies on *S. commune* [**37**, p. 425] at the Institute for Plant Physiology, University of Göttingen, was clamp connexion mycelium from the Centraalbureau voor Schimmelcultures, Baarn, and fruit bodies from various places, mainly round Stuttgart. Single spore isolates were secured on 4% malt extract gelatin plates. After 14 days these were paired on 5% malt extract agar slopes and after a further 14 days fruit body cultures were made from those with clamp connexions in 100 ml. Erlenmeyer flasks on 25 ml. malt agar with an almost perpendicular surface.

Light [cf. **38**, p. 354] was the only external factor which had a major influence on fruit body production, normal formation and function being obtained only with sunlight or incandescent light in considerable quantities. The antler-like forms of *S. commune* are interpreted as weak light forms. The Baarn strain was able to form normal fruit bodies in complete darkness, for which a dominant gene, Fs, is responsible. Furthermore, in heterozygous Fs/+ pairings Fs produces an increase in the development rate, number, and size of the fruit bodies, as well as a characteristic habit.

A recessive sterility effect of Fs appears in the mutation strain (not phase-specific) with almost 50% frequency for clamp connexion formation in the haplophase, and 100% for complete fruit body formation in dikaryons. Fs is not sexually coupled and may be localized in chromosome III.

Götting (G.), Lamprecht (L.), & Hildinger (M.). **Beiträge zur Physiologie des Echten Hausschwamms. Zur Kenntnis der Proteinzusammensetzung des Echten Hausschwamms.** [Contribution to the physiology of true dry rot. On the protein composition of true dry rot.]—*Arch. Mikrobiol.*, **30**, 2, pp. 181–189, 1958.

At the Institut für Angewandte Botanik, Technische Hochschule, Munich, the protein components in the hydrolysates of fruit bodies, aerial and culture mycelia of *Merulius lacrymans* [**29**, p. 239; **33**, p. 2] were determined qualitatively by chromatography, and quantitatively by microbiological tests.

Between fruit body and aerial mycelium protein, only quantitative differences exist in the participation of 12 amino-acids which were certainly obtained, and 2 probably so. Additional largish quantities of glycine, asparaginic acid, and lesser quantities of serine and lysine appeared in culture mycelium, whilst trytophane, histidine, cystine, and methionine were absent.

Robbins (W. J.) & Hervey (Annette). **Wood, tomato and malt extracts and growth of some basidiomycetes.**—*Mycologia*, **50** (*1958*), 5, pp. 745–752, 2 graphs, 1959.

Experimental evidence is presented showing that of 82 basidiomycetes (of 73 spp.) selected because they grew better on malt extract agar than on an agar prepared with a basal medium of mineral salts, dextrose, B vitamins, purine and pyrimidine bases, and casein hydrolysate, 72 made better growth when the liquid basal medium was supplemented with wood, tomato, or malt extract [cf. **30**, p. 117; **32**, p. 272]. Wood extract was the most generally beneficial, in some cases at 0·25 mg./25 ml. culture medium.

Ettig (B.). **Untersuchungen über die Wallbildung bei Colletotrichum atramentarium (Berk. et Br.) Taub., bewirkt durch einen antibiotisch aktiven, aeroben Sporenbildner.** [Studies on 'wall' formation in *C. atramentarium* brought about by an antibiotically active, aerobic spore former.]—*Arch. Mikrobiol.*, **29**, 4, pp. 339–347, 9 fig., 1958.

At the Institut für Allgemeine Botanik, Friedrich Schiller University, Jena, Germany, an area in a plate culture with promoted growth ('Wallbildung') adjacent to the inhibition zone was observed when certain bacteria and actinomycetes, having an antibiotic action, were grown with *C. atramentarium* [cf. **35**, p. 540] and *Gloeosporium lagenarium*. This effect was shown by a [*Bacillus*] of the *subtilis-mesentericus* group (St. 056) on *C. atramentarium*. The fungus also is very probably active in the process, being stimulated by the decomposition of the inhibition substance and the resulting products. These investigations, therefore, demonstrated that under certain conditions the eventual antagonism exerted by one micro-organism upon another may develop into synergism. 'Induced antagonism' is another complicated form of antagonism in which an inactive micro-organism can be stimulated by another to develop an inhibiting principle. When the test fungus was given precedence, it was shown to inhibit the antibiont in the streak test.

Wilson (K. S.) & Porter (C. L.). **The pathogenicity of Verticillium alboatrum as affected by muck soil antagonists.**—*Appl. Microbiol.*, **6**, 3, pp. 155–159, 1958. [*Biol. Abstr.*, **33**, 2, pp. 604–605, 1959.]

A preliminary version of this work has been noticed [**34**, p. 320].

Gilmore (A. E.). **A soil sampling tube for soil microbiology.**—*Soil Sci.*, **87**, 2, pp. 95–99, 1 diag., 1959.

At the Agricultural Experiment Station, Davis, California, the tube herein described has been hand-driven to a depth of 12 ft. in very hard soil. Full details of its construction are given. The steel tube is filled with a stack of brass liners or sample

retainers, held under slight axial compression between shoulders formed by the driving adapter and cutting point. The driving extension was made from a Veihmeyer soil sampling tube (*Soil Sci.*, **28**, pp. 147–152, 1929). Freedom from contamination is ensured by taking subsamples from a large, undisturbed primary sample. Two sizes of subsampling tubes are required, an intermediate made from $1\frac{1}{4}$-in. electrical metallic tubing and a smaller for withdrawal of final samples made from $\frac{3}{4}$-in. tubing. The design is such that cores of 2-in. diam. supported in sectional retainers can readily be obtained. Full descriptions are given of the field-sampling and subsampling procedures.

Ishizawa (S.), Suzuki (T.), Koda (T.), & Sato (O.). **Studies on microorganisms and their activities in soil.**—*Bull. nat. Inst. agric. Sci. Tokyo*, Ser. B, 8, pp. 1–211, 25 pl. (135 fig.), 2 fig., 36 graphs, 1958. [Japanese. English summary pp. 167–182, 130 ref.]

A comprehensive investigation of methods suited to the study of microbial fluctuations in the soil and the relationship of change in microflora to the method employed and the soil type is followed by detailed studies of the influence of soil stirring, moisture content, temp., acidity, and addition of organic substances on the activities of soil bacteria, fungi, and actinomycetes in two virgin soils and cultivated soil. Direct observation (microscopic method) [**14**, p. 392] gives the best picture of fungi.

Knaphus (G.) & Buchholtz (W. F.). **Vertical distribution of Pythium graminicolum in soil.**—*Iowa St. Coll. J. Sci.*, **33**, 2, pp. 201–207, 1958.

In investigations at Ames, Iowa, the basic procedure for determining infestation of a sample of soil by *P. graminicola* [**38**, p. 403] consisted in sowing a specific number of seeds of the highly susceptible crested wheat grass [*Agropyron cristatum*: **28**, p. 403]. Soil samples were collected at 0–3, 3–6, 9–12, 15–18, and 27–30 in. from 3 locations with maize, lucerne, and bluegrass [*Poa pratensis*] sod, respectively, as crop cover for at least 2 yr.

Seed was sown in unsteamed, unsteamed infested (with *P. graminicola* culture), steamed, and steamed infested subsamples of each depth sample, and the percentage of diseased seedlings determined. Equal numbers of roots from each of the several unsteamed subsamples were placed on non-nutrient agar plates and the ultimate presence or absence of lobulate sporangia typical of *P. graminicola* was recorded. At all depths *P. graminicola* was more abundant in samples from the maize than from lucerne and bluegrass sod. It was most prevalent in samples taken at 3–6 in. and occurred very infrequently at 27–30 in., or, in the lucerne and bluegrass sod, at 15–18 in. None of the unsteamed soil samples repressed the pathogenic activity of *P. graminicola* when portions of laboratory cultures were incorporated in the soil.

Karel (G.). **A preliminary list of plant diseases in Turkey.**—44 pp., Ankara, Ministry of Agriculture, 1958.

The diseases, each with its distribution in Turkey and short notes on its importance, are listed according to their hosts, which are grouped alphabetically by their botanical names under 7 general crop headings. Pathogens of interest [cf. **34**, p. 432 *et passim*] include *Phytophthora cambivora* [map 70] on chestnut; *P. citrophthora* [map 35] and *Pseudomonas syringae* [map 336] on citrus; *Podosphaera leucotricha* [map 118] on apple; *Peronospora destructor* [map 76] on onion; *Plasmodiophora brassicae* [map 101] on kale; *Pseudoperonospora cubensis* [map 285] on cucumber; *Colletotrichum linicola* [map 159] on flax; *Bacterium* [*Pseudomonas*] *solanacearum* [map 138] on tobacco; and *Sclerotium rolfsii* [map 311] on chrysanthemum.

De Carvalho (T.) & Mendes (O.). **Doenças de plantas em Moçambique.** [Plant diseases in Mozambique.]—84 pp., 59 pl., Província de Moçambique, Direcção de Agricultura e Florestas, Repartição de Sanidade Vegetal, Secção de Patalogia Vegetal, 1958.

This new edition [cf. **29**, p. 89] contains references to the following additional plant pathogens of economic importance: *Agrobacterium tumefaciens* [map 137] on roses; *Alternaria citri* on orange; *Botryodiplodia theobromae* on sugar-cane and sisal; *Cochliobolus miyabeanus* [map 92] and *Leptosphaeria salvinii* on rice; *Colletotrichum lindemuthianum* [map 177] on beans (*Phaseolus vulgaris*); *Entyloma dahliae* [map 114] on dahlia; *Guignardia bidwellii* [map 81] and *Uncinula necator* on vine; *Helminthosporium torulosum* [*Deightoniella torulosa*: map 175] on banana; *Leptosphaeria sacchari* [map 330], *Ustilago scitaminea* [map 79], and *Xanthomonas* [*Pseudomonas*] *rubrilineans* [map 39] on sugar-cane; *Leptothyrium pomi* on apple; *Phoma lingam* [map 73] on cabbage; *Physoderma maydis* on maize; *Puccinia coronata* on oats; *Septoria apii* on celery; *Spondylocladium* [*Helminthosporium*] *atrovirens* [map 233] and *Spongospora subterranea* [map 34] on potato; citrus tristeza virus [map 289] on grapefruit; *Taphrina deformans* [map 192] on peach; and *Verticillium dahliae* on cotton.

Joshi (N. C.). **The second contribution to the study of fungi from Ajmer (Rajasthan).**—*Agra Univ. J. Res.* (*Sci.*), **6**, 2, pp. 15–17, 1957. [Received 1959.]

A further 30 1st records for Ajmer, mostly plant pathogens, are reported from the Botany Dept, Government College, Ajmer, India [cf. **37**, p. 708].

Treshow (M.) & Scholes (J. F.). **The taxonomy of some species of Cytospora found in Utah.**

Treshow (M.), Richards (B. L.), & Scholes (J. F.). **The relation of temperature to the pathogenicity of Cytospora rubescens.**—*Proc. Utah Acad. Sci.*, **35** (*1957–1958*), pp. 49–51; pp. 59–63, 2 graphs, 1958.

In the Agricultural Dept, Columbia-Geneva Steel Division, U.S. Steel Corporation, morphological studies indicated that only the isolates from oak (*Quercus utahensis*) and aspen (*Populus tremuloides*) of 9 isolated from native and ornamental plants could not be readily distinguished from 28 stone fruit canker isolates which were identified as *C. rubescens* [cf. **35**, p. 686], the perfect state of which is considered to be *Valsa leucostoma*. The isolate from apple cankers was identical with it. *C.* [*V.*] *translucens* and *C. chrysosperma* [*V. sordida*] were identified on pussy willow (*Salix discolor*) and *C.* [*V.*] *nivea* on poplar (*P. bolleana*).

Three of 4 isolates of *V. leucostoma*, representing 2 extreme and 2 intermediate rates of growth, were capable of growth at 0°, 2 at 39° C., and 4 grew between 5 and 36°, which indicated that the fungus could remain active throughout the year. Opt. temps. were: Italian prune isolate 21–24°, peach 24°, and President plum and sweet cherry 27°. During infection and canker development studies under greenhouse and field conditions, involving 252 early and 252 late spring inoculations with 24 original isolates on 7 vars. of 2-year-old apricot, cherry, peach, and prune, the temp. 2 weeks after infection averaged 8° in early spring and 15° in late. All isolates were pathogenic, 56% of inoculations producing active cankers, which developed at an av. rate of 0·4 mm./day. Further double inoculations of each of 21 2-year-old apricot trees in the field with an isolate from President plum gave an av. of 71% infection, and an av. development rate of 1·4 mm./day. A similar procedure involving 104 inoculations of 56 Chinese apricot nursery whips in the greenhouse (temp. for 5 days after inoculation, 21°) with an isolate from Chinese apricot gave 64% infection, canker growth averaging 0·7 mm./day. When 8 different isolates from apple, sweet and sour cherry, peach, plum, and prune were

used for 4 inoculations on each of 20 1-year-old Chinese apricots in the greenhouse, the temp. in the 2 ensuing weeks being ±21°, 5 isolates proved pathogenic, with cankers developing in 56% of inoculations, av. growth rate 1·9 mm./day. Thus 21 of the isolates proved pathogenic, growing actively in host tissues, though varying in pathogenicity and temp. responses. Most of the 1-yr.-old trees inoculated in the spring were completely girdled and killed before autumn, the most active growth of fungus in host tissue occurring during summer. No infections were produced when the temp. averaged 8° but 59% infection resulted when the temp. exceeded 14° C.

Craigie (J. H.). **Nuclear behaviour in the diploidisation of haploid infections of Puccinia helianthi.**—Abs. in *Proc. Canad. phytopath. Soc.*, **26** (*1958*), p. 11, 1959.

It was observed at the Botany and Plant Pathology Laboratory, Ottawa, that the normal resting nuclei of *P. helianthi* [**37**, p. 104] are expanded and have true nucleoli: the daughter nuclei are at first unexpanded, but soon also expand, except when they become isolated, as with pycniospore nuclei. However, after the fusion between pycniospores and flexuous hyphae gives access to compatable mycelia, these nuclei expand, and then, rarely dividing en route, migrate to the basal region of the protoaecia where by rapid successive divisions they provide nuclei of pycniospore origin for the diploidisation of the protoaecia.

Langdon (R. F. N.) & Ting (P. W. P.). **The species of Entyloma on Bidens.**—*Aust. J. Sci.*, **21**, 3, pp. 86–87, 1958.

It is reported from University of Queensland, that *B. pilosa*, a common weed in Queensland, is frequently attacked by a smut considered to be *E. guaraniticum*, which produces numerous circular lesions on the leaves, up to 15 mm. in diam., initially pale yellow, later purple or necrotic.

Meyer (J. A.). **Appareil conidien de Tricothecium roseum Lk. ex Fr., Cylindrocarpon congoensis nov. sp. et Arthrobotrys stilbacea nov. sp.** [The conidial apparatus of *T. roseum*, *C. congoensis*, and *A. stilbacea*.]—*Bull. Soc. mycol. Fr.*, **74**, 3, pp. 236–248, 3 fig., 1958.

A study at the Division of Agronomy, Yangambi, Belgian Congo, showed that a form of *T. roseum* parasitizing the leaves of oil palm differed from the usual saprophytic form in its larger conidia, 32–33 × 11·5–13·5 μ [cf. **33**, p. 451]. The author considers that the method of sporogenesis is unique. The importance of sporogenesis as a taxonomic criterion is emphasized, but that of aggregation of conidiophores is considered to have no value.

Pateman (J. A.). **The effect of selection on ascospore size in Neurospora crassa.**—*Heredity*, **13**, 1, pp. 1–21, 1 pl., 8 diag., 1 graph, 1959.

At the University of Sheffield, the mean ascospore size of 16 generations of *N. crassa* was increased by selection from about 27 × 15 to about 37 × 18 μ. The 8-spored, wild-type asci gave way to 4-spored. In the 16th generation only about 1 ascus with 4 large, apparently mature ascospores, was produced in every 3 perithecia; only about 20% of asci contained mature spores. The method of selection was effective only up to the 8th generation. The wild-type genotype was completely dominant, and the inheritance of ascospore size and type of ascus development is considered to be controlled by a system of polygenes.

Ettlinger (L.), Corbaz (R.), & Hütter (R.). **Zur Systematik der Actinomyceten. 4. Eine Arteinteilung der Gattung Streptomyces Waksman et Henrici.** [On the systematics of the Actinomycetes. 4. A species classification of the genus *Streptomyces*.]—*Arch. Mikrobiol.*, **31**, 2, pp. 326–358, 11 fig., 1958.

As the result of studies at the Institut für spezielle Botanik der Eidg. technischen

Hochschule, Zürich, a classification of *Streptomyces* [**38**, p. 190] is proposed, which utilizes only the conclusive features, neglecting those which are variable or ambiguous [**38**, p. 69].

In all 152 collections with 103 spp. names as well as numerous individual isolates were examined according to these criteria; 34 spp. are described, of which 8 are new.

Emerson (R.). **Mycological organization.**—*Mycologia*, **50** (*1958*), 5, pp. 589–621, 70 fig., 1959.

In his presidential address to the Mycological Society of America in Aug. 1956 the author described details of the procedures evolved at the Dept of Botany, University of California, Berkeley, for the routine demonstration of the growth, differentiation, and development of some 18 genera of aquatic Phycomycetes representing 6 orders. There are sections on media and general methods and on operating directions, followed by time schedules for selected species of each genus. The organization is based on the use of pure cultures and the fact that, given an environment which can be controlled, predictable responses can be induced at will repeatedly. Eventually, it should be of great value to extend this sort of organization to all groups of fungi, and the author hopes that other workers will contribute their special knowledge and add further chapters to what may be regarded as a kind of a laboratory guide or *vade mecum* for dynamic mycology.

Mehrotra (B. S.) & Hesseltine (C. W.). **Further evaluation of the lyophil process for the preservation of Aspergilli and Penicillia.**—*Appl. Microbiol.*, **6**, 3, pp. 179–183, 1958. [*Biol. Abstr.*, **33**, 2, p. 559, 1959.]

All 78 *Aspergillus* spp. preserved by the lyophil process and stored for nearly 15 yr. were viable and had maintained their typical macro- and microscopic characters, as did 140 *Penicillium* spp., except *P. ehrlichii* and *P. lanosum*.

Jewell (F. F.). **Stain technique for rapid diagnosis of rust in Southern Pines.**—*For. Sci.*, **4**, 1, pp. 42–44, 1 fig., 1958.

An account is given of 2 stain combinations, which have proved very useful for distinguishing hyphae of *Cronartium* spp. from pine host tissues. The stains were 1 g. orseillin-BB in 100 ml. of 3% aqueous acetic acid or 0·5 g. safranin-0 in 100 ml. of 50% alcohol, and the counter-stain 0·25 g. aniline blue in 100 ml. of 90% alcohol.

Bomar (M.). **Příspěvek k zjišťování účinnosti fungitoxických sloučenin. Zkoušky fungistatické aktivity inhibující vegetativní formy mikroorganismů v populacích.** [Notes on the determination of the fungistatic effect of fungitoxic compounds. Tests of fungistatic activity inhibiting vegetative forms in populations of micro-organisms.]—*Čes. Mikrobiol.*, **2**, 4, pp. 228–233, 1957. [Russian and English summaries. *Biol. Abstr.*, **33**, 2, p. 605, 1959.]

A method is described for determining the min. conc. of fungitoxic substances inhibiting the vegetative growth of micro-organisms in culture by placing a coverslip culture on a plate of nutrient agar containing a given amount of the compound. The results are read either microscopically (rapid tests of effective concs.) or macroscopically (in addition to the former or where they are insufficient after 48 hr.) by testing the fungitoxic substance on older mycelium; the latter method is used also for bacteriostatic action.

The results obtained by this method are as accurate as those given by the Schamberg-Kolmer technique.

Hirata (S.). **Studies on the physical and chemical methods for diagnosing the virus infected Potatoes and some other crops.**—*Mem. Fac. Agric. Miyazaki Univ.*, **2**, 1, pp. 1–87, 6 graphs, 1958. [182 ref.]

In this comprehensive summary of the author's investigations since 1940 [cf. **37**,

p. 217 *et passim*] it is noted that tubers of Benimaru and other potatoes affected by crinkle [potato viruses X+A] and leaf roll viruses absorb less water than healthy potatoes, especially small tubers and at high temps. The plasmolysis of the epidermal cells of stems and leaflets of healthy plants occurs in weaker sugar solutions than with diseased but fewer cells are plasmolysed. The expressed sap from diseased potato tubers and swollen roots of radish, turnip, or sweet potato is more turbid, and has weaker colloidal stability, and the depression of the freezing point of that from potato tubers is greater. The sap from virus infected potato tubers has a greater surface tension than that from healthy, but there is little difference in turnip and radish; it also has a somewhat higher refractive index. The sugar content of healthy potato stems is generally greater than that of diseased.

A modified methylene blue diagnosis [cf. **15**, p. 822], in which 1–2 ml. of 0·03% methylene blue and 1 ml. 0·1N KOH are added to the boiled sap, proved about 70% effective; the method appears to depend on the effect of the protein in the sap on the reductive power of the reducing sugar present. In the $CuSO_4$ reaction [cf. **17**, p. 763] 3 ml. 0·5% $CuSO_4$ was added to 1 ml. of sap+1 ml. 1N KOH at 27–28° C. Using resistance to the toxic action of 0·05–0·1% $KClO_3$ for diagnosis, healthy leaves yellow less rapidly and show fewer and smaller necrotic spots than diseased.

The amount of free auxin [**35**, p. 705] was less in stems of virus-infected potato, radish, and sweet potato than in healthy, but the difference was not sufficient for diagnostic purposes.

SCHINDLER (A. F.). **Attempts to demonstrate the transmission of plant viruses by plant parasitic nematodes.**—*Plant Dis. Reptr*, **42**, 12, pp. 1348-1350, 1958. [19 ref.]

In experiments by the U.S. Dept Agric. the addition of approximately 173,000 root-knot nematode larvae (*Meloidogyne* spp.)/flat failed to increase the percentage of virus infection in tomato or tobacco seedlings grown in sterilized soil that was drenched with suspensions of tobacco mosaic virus or cucumber mosaic virus.

In a 2nd experiment nematodes (*Helicotylenchus nannus*, known to wound carnation roots, and *Paratylenchus* spp.) from soil in which carnations infected by carnation mottle virus had grown for 7 months were used to inoculate soil containing healthy carnation seedlings. No virus infection of these was detected when the tops and roots were indexed 2 and 3 months later, respectively, on *Chenopodium amaranticolor*.

KÖHLER (E.). **Über das Verhalten einiger Mosaikviren im geimpften Blatt im Anschluß an die Impfung.** [On the behaviour of some mosaic viruses in the inoculated leaf in relation to inoculation.]—*Arch. Mikrobiol.*, **29**, 4, pp. 394–405, 7 graphs, 1958.

In further studies [cf. **38**, p. 134] inactivation of a virus introduced by abrasion ensued in both susceptible (host) and non-susceptible (non-host) plants on similar lines. The non-hosts, bean (*Phaseolus vulgaris*) and U.S. seed potato 41956 [**36**, p. 779], and the highly susceptible potato str. A6 inoculated with potato virus X gave similar inactivation curves. Inactivation in the greenhouse was more rapid than in a cold chamber at 2°.

The effects of the virus on *Datura stramonium* were also studied.

With tobacco mosaic [cf. **27**, p. 262] in Konserva bean, after approx. 24 hr. a temporary new formation of active virus occurred, which was also inactivated 80 hr. after inoculation. This would appear to be an active counteraction by the host, to be interpreted as a protective reaction. In 3 new tests on *Nicotiana glutinosa*, each in Sept. (1944, 1955, 1957) at moderate temp., it was established that infectiousness declines to min. in the 30–48 hr. period, followed by a rise to a max. at 72 hr.

Gradual inactivation of the newly formed virus then ensued. The course of infection up to 30 hr. remained unresolved.

With potato virus A in Samsun tobacco, tested on *Solanum demissum*, no active virus could be determined for over 24 hr., but it appeared again at 32 hr. Tobacco ring spot virus, causing potato bouquet disease, showed a similar eclipse. After 48 hr. the virus was fully active, reaching the max. after 4 days.

According to the development of the infection curves, it seems most improbable that a new synthesis occurs during the eclipse of an active virus.

Brčák (J.), Polák (Z.), & Pintera (A.). **Inhibiční vliv šťávy z Phytolacca americana a P. acinosa na infekči virem Tabákově mosaiky a virem mosaiku Řepy.** [The inhibitory effect of *P. americana* and *P. acinosa* on infection by Tobacco mosaic and Beet mosaic viruses.]—*Čsl. Biol.*, **6**, 5, pp. 386–392, 1957. [Abs. in *Referat. Zh. Biol., 1958*, 20, p. 51, 1958.]

At the Phytopathological Section, of the Botanical Institute, Czechoslovak Academy of Science, when equal quantities of sap from the leaves of *P. americana* and from sugar beet infected by beet mosaic virus were mixed at pH 7 the infectivity of the virus was almost completely inactivated. With more *P. americana* sap, the inactivation was complete. In similar experiments *P. acinosa* had slighter effect.

A 1:3 mixture of tobacco sap containing the yellow strain of tobacco mosaic virus with *P. americana* or *P. acinosa* sap decreased necrosis in *Nicotiana glutinosa* by 94–98%.

Tolle (R.). **Untersuchungen über die Pseudomycorrhiza von Gramineen.** [Studies on the pseudomycorrhiza of Gramineae.]—*Arch. Mikrobiol.*, **30**, 3, pp. 285–303, 7 fig., 1 graph, 1958.

At the Institut für Mikrobiologie, University of Göttingen, Germany, attempts to isolate the mycorrhizal fungi from the roots of oats, wheat, rye, and barley were not successful, though a certain growth was obtained on natural substrata of which sterile root secretions were most effective for hyphal growth.

In the 4 cereals a certain species specificity was apparent in the morphological differences in the hyphae and in the portals of entry. By bringing together sections containing mycorrhiza and sterile plant roots, a synthesis of mycorrhiza was possible under certain circumstances. Root sections of oats and barley produced new mycorrhiza only in oats and barley, respectively; those of rye produced them in both rye and wheat.

The incidence of mycorrhiza formation is directly proportional to the length of exposure to light, apparently because of better assimilation by the host. There is also an opt. degree of humidity: for oats and barley it is 60% of the water capacity of the soil, for rye 80%, and for wheat 80–100%.

Khovanskaya (Mme K. N.). Испытание новых фунгицидов в борьбе с головней зерновых культур. [Trials with new fungicides for the control of cereal smut.]—Бюл. науч.-техн. информ. Льгов. опыт.-селек. Ст. [*Bull. nauch.-tech. inform. L'gov. opit.-selec. Sta.*], *1958*, 1, pp. 61–64, 1958. [Abs. in *Referat. Zh. Biol., 1959*, 2, p. 203, 1959.]

Tests since 1953 at the L'gov Experimental Station, U.S.S.R., have shown granosan and mercuran to be most effective against bunt [*Tilletia caries*: **37**, p. 345; **38**, p. 138] of winter and spring wheat and loose smut [*Ustilago avenae*: **38**, p. 80] and covered smut [*U. hordei*: **33**, p. 717] of oats. Thiram was promising but not so effective.

De Tempe (J.). **Granen, het onderzoek naar hun gezondheid en de uitzaaiwaarde van het zaaizaad.** [Cereals, the inspection of their health and the field

performance of the sown seed.]—*Jversl. Rijksproefst. Zaadcontr., Wageningen, 1956–7*, pp. 53–61, 3 graphs, 1958. [English summary.]

Infection of summer wheat by *Fusarium* spp. and of summer barley (especially vars. Agio, Rioline, and Frisia) by *Helminthosporium sativum* [*Cochliobolus sativus*] is prevalent in the Netherlands, causing crop reductions of 10–25% in certain seasons. During a 3-yr. period incidence in the seed was determined by filter-paper tests at 10° C. for 3 days followed by a further 3 at 20°. Part of each of the numerous samples was treated with 0·2–0·3% of a common [unnamed] mercurial dressing and (in 1957 only) with thiram.

In 1955, 1956, and 1957, when the infection levels of the wheat samples were 34, 13·5, and 19%, respectively, mercurial treatment increased emergence by 14, 2·5, and 15%, respectively; plant weight was increased by 14·5 and 4% in 1955 and 1957 but in 1956 it was reduced by 3%. Thiram raised emergence by 33·5% and weight by 30%.

The infection in the barley samples in the 3 yr. was 50·5, 33, and 23·5%. In the 1st 2 the mercurial increased emergence and weight by 5·5 and 18 and 10·5 and 6·5%, respectively, but in the 3rd it caused reductions of 1·5 and 10%, respectively. Thiram raised emergence by 6% and weight by 8·5%.

The injurious effects of mercurials, especially on healthy and slightly infected seed, are well known and were also observed in these trials. Nevertheless, though thiram affords superior protection after sowing and is non-phytotoxic, its disinfectant action is less strong than that of Hg, and its general substitution for the latter might result in a spread of seed-borne infections. It could, however, advantageously be added to the mercurial to reinforce the protective effect of the treatment.

Fuchs (W. H.) & Siebert (Renate). **Über die Sauerstoffaufnahme rostinfizierter Pflanzen.** [On the oxygen uptake of rust-infected plants.]—*Naturwissenschaften*, **46**, 3, pp. 115–116, 1 graph, 1959.

At the Institut für Pflanzenpathologie und Pflanzenschutz, University of Göttingen, Germany, Marquis wheat was inoculated with *Puccinia graminis* + 10^{-2} M malonate [**36**, p. 608; **37**, p. 528] or $2 \cdot 10^{-3}$ M fluoracetate and exposed to 7,000 or 3,000 lux for 15 hr. daily at 25–27° C. The inhibitory effect of malonate on O uptake declined only gradually during the initial stage of infection, increasing again about the 4th day and finally decreasing to 20% approx. of the initial level on the 8th. At 3,000 lux the inhibition of O uptake by malonate was stronger on the 2nd day than at 7,000, but it decreased more rapidly and remained weaker from the 4th day onwards, apart from a transient rise to a less well-marked peak on the 5th.

Fluoracetate inhibition was also more pronounced in weakly than in strongly illuminated plants during the early phase of infection and then declined more steeply. At 7,000 lux it fell to a min. on the 3rd day and then rose to the initial level. With low light intensity the more noticeable min. occurred on the 4th day after inoculation; on the 5th the reduction of O assimilation was substantially greater at low than at high illumination. The delayed min. in the former was accompanied by a corresponding delay in sporulation on the slightly etiolated leaves.

These results afford further evidence of the divergent changes induced by obligate parasites in the activity of the enzyme systems of their hosts during the incubation period [cf. **30**, p. 240; **37**, p. 348].

Prentice (N.), Cuendet (L. S.), Geddes (W. F.), & Smith (F.). **The constitution of a glucomannan from Wheat stem rust (Puccinia graminis tritici) urediospores.**—*J. Amer. chem. Soc.*, **31**, 3, pp. 684–688, 1959.

Methylation and periodate oxidation studies at the Minnesota Agricultural Experiment Station, St. Paul, have demonstrated that the average repeating unit of

the glucomannan previously recognized in mixed races of *P. graminis* (*Nature, Lond.*, **174**, p. 1151, 1954) consists of about 6 terminal non-reducing residues (3 of D-glucose, 3 of D-mannose), 104 non-terminal D-mannose residues (52 residues linked through C_1 and C_4, 52 through C_1 and C_3), and 4 branching residues probably constituted by D-glucose units joined through C_1, C_2, and C_6. The glycosidic linkages are of the β-D-type. An aqueous extract of the spores was shown to contain glycerol, D-arabitol, and D-mannitol.

Purdy (L. H.). **Results of regional seed-treatment tests for the control of seed-borne and soil-borne common bunt of winter Wheat in the Pacific Northwest, 1958.**—*Plant Dis. Reptr*, **42**, 12, pp. 1382–1386, 1958.

The majority of 26 fungicides [cf. **37**, p. 404] tested against bunt (*Tilletia caries* and *T. foetida*) in 8 localities gave good control of seed-borne infection of Orin wheat, many reducing infected heads from 82·2% in the inoculated control to less than 1%. All formulations of hexachlorobenzene, Monsanto liquid PCNB, and the wettable powder formulation of terraclor were highly effective in preventing infection from inoculated soil, which was reduced from 67·2% to less than 9%; mercurials used were not satisfactory.

Petralia (L.). **I Frumenti teneri e i Frumenti duri di fronte alle infezioni artificiali da 'carie' (Tilletia spp.) negli ambienti pedoclimatici della Sicilia. (Nota preliminare).** [Soft and hard Wheats in relation to artificial infection by bunt (*Tilletia* spp.) in the pedoclimatic conditions in Sicily. (Preliminary note).]—*Ann. Sper. agr.*, N.S., **12**, 6, pp. 1557–1568, 1958. [English summary.]

In preliminary tests at the Stazione Sperimentale di Granicoltura per la Sicilia, Catania, 4 hard and 4 soft wheat vars. were grown from seed experimentally infected with spores of *T. caries* and *T. foetens* [*T. foetida*] in 2 fields in widely separated localities. The results confirmed that hard wheats are as a rule less susceptible to bunt than soft ones, but of the latter Casale 37 and Ariana 8/H showed a similar resistance to the hard ones.

Comes (I). **Intensitatea infecțiilor cu mălura Grînelui în raport cu cantitatea de spori și cu eficacitatea fungicidelor folosite.** [The intensity of infection of Wheat by bunt in relation to the quantity of spores and the strength of the fungicides used.]—*Anu. lucrâr. ști. Inst. agron. Craiova, 1957*, pp. 349–353, 1957. [Russian and French summaries. Abs. in *Referat. Zh. Biol., 1959*, 2, p. 203, 1959.]

When A-15 wheat grain was treated with abavit, formalin, or $CuSO_4$ solution or left untreated and then inoculated with different spore loads of *Tilletia foetens* [*T. foetida*: **37**, p. 514] infection (12–43 [%]) occurred in plants from untreated seed bearing only the highest number of spores; in similar treated samples it was 0–1·67%.

Block (G.). **Untersuchungen über die Braunfleckigkeit (Spelzenbräune) des Weizens (Septoria nodorum Berk.), insbesondere in Bezug auf Infektionsbedingungen, Sortenanfälligkeit und wirtschaftliche Bedeutung des Pilzes.** [Studies on brown spot (glume blotch) of Wheat (*S. nodorum*), especially in relation to conditions for infection, varietal susceptibility, and economic importance of the fungus.] —*Z. Acker- u. PflBau.* **107**, 4, pp. 435–458, 4 fig., 1959.

An expanded, tabulated survey of studies already noticed [**37**, p. 32].

Summers (T. E.) & Buchholtz (W. F.). **Time and frequency of recovery of Pythium debaryanum and Pythium graminicolum from roots of growing Barley seedlings.** —*Iowa St. Coll. J. Sci.*, **33**, 2, pp. 209–217, 2 graphs, 1958.

In a study at Ames, Iowa, on the relative abundance of *P. debaryanum* and *P. graminicola* [**37**, p. 527; **38**, p. 396] on barley roots at successive stages of seed

germination and seedling development, pathogen-free Arivat barley seeds were sown in field soil in greenhouse and field at intervals during 3 Apr.–8 July, 1947.

P. debaryanum was isolated with moderate frequency during Apr., with high frequency in May and June, and very infrequently in July. There was no isolation of *P. graminicola* in Apr., but it appeared with increasing moderate to high frequency in May–June, with a decline in July. In Apr.–May plantings it was isolated at frequencies of 10% or more only after av. root lengths attained 8·3 cm. In June–July plantings, similar frequencies were only obtained after av. root lengths reached 4·8 cm. Field and greenhouse data for the recovery of *P. graminicola* show a striking similarity and a tendency is clearly evident towards increase in frequency of isolation with increase in the size of plants, until after mid-July. It is concluded that *P. graminicola* does not occur in germinating barley seeds. Frequency of *P. debaryanum* is governed by the season and it occurs either in or on seeds or roots.

Lindberg (G. D.). **A transmissible disease of Helminthosporium victoriae.**—*Phytopathology*, **49**, 1, pp. 29–32, 2 fig., 1959.

At Louisiana Agricultural Experiment Station, Baton Rouge, abnormally stunted colonies were observed in cultures of *H. victoriae* from Victor-grain oats. When inoculum from normal colonies was dipped in the supernatant liquid from a macerated suspension of an abnormal colony and plated on potato dextrose agar, abnormal growth resulted after 24 hr. incubation and also appeared within a few hours at the point of contact of normal and abnormal colonies growing together on the same plate. One isolate remained unaffected.

The fact that no bacteria could be seen, that no cloudiness was produced in broth cultures, and that streptomycin sulphate failed to eliminate the agent indicated that bacteria were not responsible. Multiplication in previously normal isolates and the fact that medium adjacent to abnormal colonies could not transmit the condition suggested that a toxin was not involved. Dilutions of clarified suspensions of abnormal growth were still slightly active at 1:1,000, but not at 1:5,000, and the agent was destroyed by heat at 50° C. but not at 45°. Filtration through bacteriological filters removed the agent, which was separated from the fungus by fractionation with ammonium sulphate and centrifugation. The agent could not be demonstrated by electron microscopy, but the possibility that it may be a virus is considered.

[St.] Garay (A.). **Substances spéciales jouant un rôle dans l'infection des plantes, particulièrement en ce qui concerne l'ergot du Seigle (Claviceps purpurea).** [Special substances playing a part in the infection of plants, with particular reference to ergot of Rye (*C. purpurea*).]—*Acta biol. hung.*, **7**, pp. 325–335, 1 graph, 1957. [Russian and English summaries. 31 ref.]

At the Institut de Recherches des Plantes Médicinales, Budapest, sclerotia of *C. purpurea* [cf. **36**, p. 758] were found to contain at least 2 substances which exerted an inhibitory effect on rye seedlings and isolated wheat roots and occurred in very small quantities in culture. The toxins migrate into the capitula during the germination of the sclerotia, a fact that is considered to explain the highly infective nature of the ascospores. One of the sclerotial substances is trimethylamine.

Honeydew conidia germinated better *in vitro* than those of saprophytic origin [**35**, p. 364], partly because the former contain stimulatory substances. A partial explanation of the greater virulence of honeydew than of saprophytic conidia is afforded by the occurrence in the conidium-free sap of the honeydew of protectants against anti-metabolites, including eryothioneine [loc. cit.]. These stimulatory and protective substances develop solely in association with a parasitic mode of existence, whereas the toxins, as indicated above, are also produced in low conc. during the saprophytic phase.

Storey (H. H.) & Howland (Audrie K.). **Resistance in Maize to the tropical American rust fungus, Puccinia polysora. II Linkage of genes Rpp_1 and Rpp_2.** —*Heredity*, **13**, 1, pp. 61–65, 1959.

In further studies [cf. **37**, p. 533; **38**, p. 55] the progeny of a cross between pure lines carrying Rpp_1 (R_1) or Rpp_2 (R_2) resistance genes gave a reaction characteristic of R_1 when inoculated with race EA.1, and that characteristic of R_2 when inoculated with race EA. 2. Observations on the backcrosses and repulsion and coupling in F_2 seedlings inoculated simultaneously on separate leaves with the 2 races, indicated that the 2 genes were linked. Pure double-dominant recombinant ((R_1R_2) (R_1R_2)) families were selected from F_3. R_1 was also crossed with another line pure for R_2 but modified by minor genes, which lowered resistance, sometimes to full susceptibility, but this did not disprove the identity of the resistance gene.

Ehrlich (H. G.). **Nuclear behavior in mycelium of a solopathogenic line and in a cross of two haploid lines of Ustilago maydis (DC.) Cda.**—*Mycologia*, **50** (*1958*), 5, pp. 622–627, 1 graph, 1959.

At the University of Minnesota, St Paul, Macross maize seedlings were inoculated with the solopathogenic line 410 qq of *U. maydis* [**37**, p. 533; **38**, p. 140] or with a mixture of the haploid lines $10A_4$ and $17D_4$ from agitated potato dextrose broth cultures, and were harvested at intervals, starting 4 days after inoculation until death.

The 3 isolates were typically uninucleate in artificial culture. The solopathogen was characteristically uninucleate throughout its development in the host and no evidence was obtained that indicated karyogamy. The mycelium from the compatible haploid lines in the host was at first uninucleate. A progressive increase in the percentage of dikaryotic cells occurred, however, until 11 days after inoculation, when the trend became reversed and uninucleate cells again predominated. The changes in nuclear condition were regarded as due to dikaryotization followed by nuclear unions. Karyogamy took place before any recognizable chlamydospore formation had occurred.

Čatská (Vlasta). **Výskyt a isolace bakterií antagonistických vůči Ustilago zeae (Beckm.) Unger.** [The incidence and isolation of a bacterium antagonistic to *U. maydis*.]—*Čes. Mikrobiol.*, **2**, 5, pp. 318–323, 1957. [Russian and English summaries. *Biol. Abstr.*, **33**, 2, p. 600, 1959.]

During the culture of *U. maydis* on an artificial medium, 2 different bacteria were isolated from the surface of chlamydospores. One (B-I), a *Pseudomonas*, was antagonistic to *U. maydis* and inhibited germination of the chlamydospores. Under natural conditions B-I prevented the development of smut in maize plants. The other (B-II) was not antagonistic to *U. maydis*, but made it difficult to secure an aseptic culture. The identity of cultures of the 2 organisms, isolated in different years from various regions, was demonstrated serologically.

To obtain an aseptic culture of *U. maydis* a special technique was used, in which chlamydospores were germinated in hanging drops in test-tubes containing wort agar, and after 48 hr. at 27° C. an aseptic culture was secured. Free Cl in tap water probably destroys the bacteria.

Jenkins (Merle T.) & Robert (Alice L.). **Evaluating the breeding potential of inbred lines of Corn resistant to the leaf blight caused by Helminthosporium turcicum.**—*Agron. J.*, **51**, 2, pp. 93–96, 1959.

In a co-operative investigation at the Everglades Experiment Station, Belle Glade, Florida, the breeding reaction of 30 inbred lines of maize to heavy infection by *H.*

turcicum [cf. **37**, p. 39] was studied by crossing each line with the susceptible tester lines, R_4, Tr, and 187–2. The variances for lines, testers, and lines × testers were highly significant. The lines with many highly resistant plants in the F_2 were GE 440, CI. 90A, CI. 93A, and Wh 4971; CI. 86A, CI. 28A, and Ky114 were promising. The use of crosses on susceptible testers appears to offer a possible method of evaluating differences in potential breeding value among resistant lines.

Smeltzer (D. G.). **Relationship between Fusarium ear rot and Corn earworm infestation.**—*Agron. J.*, **51**, 1, pp. 53–54, 1959.

In tests by the Dept of Agronomy, Davis, California, it was shown that the reduction of *Heliothis obsoleta* infestation by the use of DDT in 20 var. of maize was accompanied by a reduction in kernel damage by *Fusarium moniliforme* [*Gibberella fujikuroi*: **28**, p. 570]. Only 7% of the uninfested ears had ear rot, in contrast to 26·5% in infested.

It is suggested that *H. obsoleta* can affect results of *G. fujikuroi* resistance screening trials or genetic studies.

Control of the insect could reduce losses from *G. fujikuroi* in areas where the disease may be an important factor in maize production.

Ali (S. B.), Ghafoor (A), & Akbar (K.). **Sooty mold of Rice in Pakistan.**—*F.A.O. Pl. Prot. Bull.*, **7**, 1, pp. 10–12, 2 fig., 1958.

During the summers of 1952 and 1953, Khasro rice at Buhara, 60 miles E. of Karachi, was seriously infested by aphids and later infected by sooty moulds, which damaged about 50% of the plants. The moulds began to appear on the honey-dew in early Sept., were favoured by standing water, and covered the affected plants. On the worst affected of these, 78·5% of the spikelets were empty or contained only poor grains. In a sample of 500 grains from mouldy spikelets 72·8% were discoloured, though only 20·8% from clean spikelets were so affected; 75% of the discoloured and 30% of the clean grains yielded fungi.

Goliadze (S. K.). Методы определения мальсекко-устойчивости Цитрусовых растений. [Methods for determining the resistance of Citrus plants to mal-secco.]—Бюл. всес. н.-и. Ин-та Чая субтроп. Культ. [*Bull. vsesoyuz. n.i. Inst. Chaya Subtrop. Cult.*], *1957*, 1, pp. 158–179, 1957. [English summary. Abs. in *Referat. Zh. Biol.*, *1959*, 4, p. 204, 1959.]

In the Anaseuli region, Georgia, U.S.S.R., the local vars. of lemon are more resistant than others to mal-secco [*Deuterophoma tracheiphila*: **37**, p. 353]. Susceptibility is dominant. Toxins of the fungus caused damping-off and they are being investigated. Results obtained in the laboratory of the resistance of lemons to the disease are given.

Weber (G. F.) & Abrego (L.). **Damping-off and thread blights of Coffee in El Salvador.**—*Plant Dis. Reptr*, **42**, 12, pp. 1378–1381, 6 fig., 1958.

At the Instituto Salvadoreno de Investigaciones del Cafe, Santa Tecla, it was observed that in nurseries *Rhizoctonia* [*Corticium*] *solani* [**33**, p. 351], in addition to causing the usual injury at soil level, spread rapidly among the cotyledons of adjoining seedlings without contact with the soil, sometimes causing 50% loss. The basidial state may appear on moribund tissues. *Corticium* [*Sclerotium*] *rolfsii* was also isolated from young seedlings showing damping off, with symptoms somewhat different from those caused by *C. solani*; no previous record of this fungus parasitizing coffee was found [but see **32**, p. 303].

Rhizoctonia ramicola [**30**, p. 612], pathogenic to many ornamental perennials, was found for the 1st time to cause considerable defoliation and fruit infection in coffee plants; symptoms included off-colour and spotting of the foliage, which

subsequently became brown and remained weakly attached by the hyphae. *Pellicularia koleroga* [**36**, p. 354] continues to be severe and widespread on coffee.

Mirpulatov (K. I.). Новые методы борьбы с болезнями и вредителями Хлопчатника. [New methods for the control of diseases and pests of Cotton.]—Матер. Меж. коорд. н.-и. Раб. Хлопк. А. Н. Уз. ССР [*Mater. Mezh. koord. n.-i. Rab. Khlopk. Acad. Sci. Uz. SSR.*], *1957*, pp. 179–186, 1957. [Abs. in *Referat. Zh. Biol.*, *1959*, 5, p. 206, 1959.]

Cotton seeds, attacked by gummosis [*Xanthomonas malvacearum*: **37**, p. 537], treated with 20% copper trichlorophenate at 7 kg./ton, gave plants with considerably less infection. Cuprean with trichlorophenol+BHC was effective against soil diseases and pests. Against *Fusarium* wilt [*F. oxysporum* f. *vasinfectum*: **37**, p. 663] soil application of ethylenedibromide is recommended.

Bird (L. S.) & Hadley (H. H.). **A statistical study of the inheritance of Stoneville 20 resistance to the bacterial blight disease of Cotton in the presence of Xanthomonas malvacearum races 1 and 2.**—*Genetics*, **43** (*1958*), 5, pp. 750–767, 1 fig., 2 graphs, 1959.

In further studies at College Station, Texas [cf. **38**, p. 55], composite and separate inoculations with races 1 and 2 of *X. malvacearum* showed that Stoneville 20 cotton was highly resistant to race 1, but only slightly so to race 2. Some F_2 plants from Stoneville 20 × Stoneville 2B [cf. **31**, p. 433] were like the former parent, some were resistant to race 2 and susceptible to race 1, and a small proportion was resistant to both. The results indicate that data based on a single genetic background and on the F_1 and F_2 generations can be very misleading as to whether dominance is present or absent, and whether resistance is dominant or recessive. It is concluded that the factors conditioning Stoneville 20 resistance are not linked, though a measurable amount of genetic interaction is present [**33**, p. 481].

Comparison of formulae for estimating the number of effective factors indicated 1 effective factor in Deltapine and Stoneville 2B attributable to the minor gene components, B_{Dm} and B_{Sm}, respectively; both have some genes in common which appear as 1 effective factor when present together. Acala [cf. **34**, p. 149] has no effective factor. The minor fortifying genes in Stoneville 20 [**33**, p. 481] are now represented as B_{Sm}. The major and minor genes are additive with no dominance, the additive effect of 1 major (B_7 b_7) gene was greater and influenced less by environment in the presence of 1 B_{-m} component. The heritability of Stoneville 20 resistance in the F_2 was about 45–50% and material with such resistance to races 1 and 2 could be obtained by maintaining genetic variability and selecting individual plants for resistance. Better progress and higher resistance could be obtained within material with 2 or more components of minor genes. It is concluded that statistical genetic studies of characters which are measured phenotypically by assigning disease grades can be successful.

Sinclair (J. B.), Neal (D. C.), Chandler (E. K.), Johns (D. M.), Sloane (L. W.), & Walters (D.). **Field screening of various fungicides for control of Cotton seedling damping-off.**—*Plant Dis. Reptr*, **42**, 12, pp. 1372–1375, 1958.

Field trials by the Louisiana Agricultural Experiment Station, Baton Rouge, in 1957–8, confirmed results of greenhouse trials [**37**, p. 479] and showed PCNB+captan to be promising for the control of damping-off due to *Rhizoctonia* [*Corticium*] *solani* and possibly such other fungi as *Fusarium* spp. and *Pythium* spp. [cf. **37**, p. 761]. In 1958 PCNB+captan+zineb, captan+zineb, PCNB+captan, PCNB+dichlone, PCNB+nabam, and nabam+$CaCl_2$ showed the greatest promise. Dusts in-the-furrow at planting [cf. **36**, p. 469] tended to give better results than liquid in-the-furrow treatments.

De Tempe (J.). **Lijnzaadinfecties, hun bepaling, belang en bestrijding.** [Flax seed infections, their determination, importance, and control.] –*Jvsl. Rijksproefst. Zaadcontr. Wageningen, 1956–57*, pp. 67–70, 1958. [English summary.]

At the Netherlands Seed Testing Station seed-borne infections are mostly determined by the blotter method, which has shown *Botrytis cinerea* to be the most frequent and important contaminant of flax [**38**, p. 209]; a single infected seed may cause the loss of up to 7 plants and the disease may necessitate ploughing-under. *Ascochyta linicola* [**35**, p. 185], which has become prominent since 1954, may be troublesome in retting but seldom attains high incidence in the seed.

The percentage of germination is twice as high in the light as in darkness, while the count is again doubled by the use of nutrient agar [cf. below] as a substitute for the blotter.

Thiram or a thiram-Hg mixture for the control of *B. cinerea* should be applied even to seed lots with less than 5% infection. The complete elimination of *A. linicola* [cf. **38**, p. 85] presents much greater difficulty and even the most volatile Hg compounds are not wholly effective. The same is true of the *Fusarium* spp. of the *roseum* group which tend to be widespread after a damp growing season. The other contaminants encountered, e.g., *Sclerotinia sclerotiorum*, *Alternaria* spp., including *A. linicola* [cf. **38**, p. 146], and *Colletotrichum linicola*, are more or less superficial and readily removable by seed disinfection.

Mühle (E.). **Kritische Untersuchungen zur Methodik der Prüfung von Leinsamen auf Befall durch Polyspora lini Laff. und Colletotrichum linicola Pethybr. et Laff.** [Critical studies on the methods of testing Flax seed for infection by *P. lini* and *C. linicola*.]—*Phytopath. Z.*, **34**, 3, pp. 315–324, 2 fig., 1959. [English summary.]

From the Institut für Pflanzenzüchtung Bernburg, Berlin, it is recommended that in certain cases field certification of flax should be supplemented by a seed test with the object of improving seed certification methods [cf. **31**, p. 118; **38**, p. 209]. An experimental comparison of the methods employed [cf. above] at present led to the conclusion that the result is not affected either by the seed being laid on or in the nutrient substrate or by the incorporation of either biolmalt or plum juice in the agar. On the other hand, any pre-treatment, such as preliminary washing, may lead to erroneous results.

On the basis of the results obtained it is proposed that seeds for testing be treated with 0·3% germisan for 10 min., followed by 2 immersions of the disinfected seed in sterilized distilled water. The seed should be partially dried between 2 sterilized filter papers to simplify further operations, which consist in incubating the seeds on 2% biomalt agar plates at 22–24° C.

Šutić (D.) & Dowson (W. J.). **An investigation of a serious disease of Hemp (Cannabis sativa L.) in Jugoslavia.**—*Phytopath. Z.*, **34**, 3, pp. 307–314, 9 fig., 1959. [German summary.]

A bacteriosis of hemp caused by *Pseudomonas cannabina*, hitherto undescribed, was observed for the 1st time in the province of Banat in July 1955. All the green parts of the plant were attacked, the symptoms being most pronounced on the leaves on which spots first appear, later developing into holes. At first the spots are minute and water-soaked; they enlarge and become irregular, the smaller ones being bordered by the veins but the larger spreading to form blotches with irregular margins. The extension of the spots along the veins is characteristic and may reach several cm. in length. The lateral veins also are often infected for the whole of their length. Occasionally dirty white waxy layers of bacterial exudate are observed. The tissues of the spots wither, become a characteristic brown, then sooty colour. The necrotic parts at the edge of the leaf also fall out producing a more or less

ragged outline. Infection of younger leaves makes their development irregular, some parts becoming dwarfed and deformed. Young infected plants are also retarded and if the upper parts of the stems have been infected the internodes are shortened, with leaves compacted into a more or less rosette form.

The sticky nature of the growth on agar and the pigment formation suggested *P. caryophylli*, but *P. cannabina* ferments lactose and maltose in addition to sucrose and does not liquefy gelatin or reduce nitrate. Among a number of other plants inoculated with the bacterium, only *Phaseolus vulgaris* proved susceptible, and this to a high degree. Polygonal coffee-coloured spots occurred on the leaves and also on the pod, which shrivelled in the early stages of infection, and irregular coffee-coloured zones appeared on the seed surface. The disease is probably seed-borne.

De Tempe (J.). **Gezondheidsonderzoek van bloemzaden.** [Investigation on the health of flower seeds.]—*Jvsl. Rijksproefst. Zaadcontr., Wageningen, 1956–7*, pp. 81–82, 1958. [English summary.]

Commercial samples of antirrhinum seeds were extensively contaminated by *Puccinia antirrhini*. Up to 2% infection by *Alternaria dianthicola* occurred in carnation seeds. Samples of *Eschscholtzia californica* yielded up to 10% *Heterosporium eschscholtziae* [cf. **38**, p. 54]. One lot of *Linaria maroccana* contained 1% *A. angallidis* var. *linariae*. *Phoma* (?) *rhoeadis* (19%) and *Dendryphion penicillatum* [*Pleospora papaveracea*] (14%) were detected in one sample of *Papaver* sp. *Tagetes erecta* was infected by *Phyllosticta* sp. and *A.* (?) *zinniae*. The incidence of the latter was reduced from 48 to 4% by treatment with the mercurial aagusan and to 14% by thiram. In a greenhouse test, however, emergence was raised to 49% by thiram as compared with 21% for aagusan and 16% for the control.

Pesante (A.). **Sopra una tracheomicosi da Rhizoctonia del Garofano.** [On a tracheomycosis of Carnation caused by *Rhizoctonia*.]—Reprinted from *Atti Accad., Torino*, **93** (*1958–9*), 6 pp., 2 fig., [? 1959. English summary.]

A study at the Laboratorio Sperimentale di Fitopatologia, Turin, Italy, demonstrated that carnation plants become affected by *Corticium solani* [cf. **36**, p. 762] early in Aug. Spots appear, but scarcely spread, and up to the following summer the disease does not appear to worsen, though the plants remain small and the leaves are narrow and upright. The fungus is present in the roots, collar, and lower part of the stem, but was not above this. The affected wood appears a dirty brown; the fungus is confined to the tracheids, frequently obstructing the lumen. Many vessels gradually fill with a reddish-brown substance (? a gum), but in spite of these occlusions, no wilting occurred. As no stromata formed in culture, even after a month, the fungus is considered probably to be a strain of *C. solani* [cf. **28**, p. 396].

Kristensen (H. R.) & Thomsen (A.). **Chrysanthemumviroser.** [Chrysanthemum viruses.]—*Tidsskr. Planteavl*, **62**, 4, pp. 627–669, 10 fig., 1 diag., 1958. [English summary. 40 ref.]

A tabulated survey is given of studies during the last 5 yr. at the Danish State Experiment Station for Plant Diseases on tomato aspermy virus in chrysanthemum [cf. **37**, p. 59]. Indexing to tobacco plants resulted in the detection of the virus in 64 vars., while transmission to 20 spp. of plants, including potato and 4 others not previously reported as susceptible, was effected by mechanical sap inoculation. Heat-treatment experiments during 1954–56 were successful; the virus was sometimes inactivated after 14 days' exposure to 37–38° C., though a min. period of 32 days is recommended for more reliable results. The most favourable time for the treatment appeared to be Apr.–May. The virus is more readily inactivated in small than in large plants, which tend to make only a partial recovery, though mostly

providing healthy material for cuttings. Prevention should be based on control of the aphid vector, *Myzus persicae*, separation of diseased from healthy plants, selection of sound mother plants, and propagation of virus-free plants in isolation.

Eight other viroses are described but they have not been investigated in Denmark.

Schneider (Roswitha). **Septoria obesa Sydow als Erreger einer Blattfleckenkrankheit auf Chrysanthemum indicum L. in Deutschland.** [*S. obesa* as the causal agent of a leaf spot disease of *C. indicum* in Germany.]—*Phytopath. Z.*, **34**, 3, pp. 269–284, 5 fig., 2 graphs, 1959. [English summary.]

It is reported from the Institut für Mykologie, Berlin-Dahlem, that *S. obesa* [cf. **36**, p. 646] was observed for the 1st time in Europe on *C. indicum* in a Berlin nursery in 1957. Both it and *S. chrysanthemella* [cf. **36**, p. 700] are widespread on cultivated *C. indicum* in field and greenhouse in Berlin and in the German Federal Republic. The initial symptoms of the 2 fungi can easily be differentiated in the early stages, though later they are similar. *S. obesa* produces irregular chlorotic spots which often merge to form large brown patches, whereas *S. chrysanthemella* produces brown to black sharply defined spots which are necrotic from the beginning, and often ringed with a chlorotic halo of varying width. The opt. temp. for *S. obesa* is 20–28° C., with little growth at 32°. For *S. chrysanthemella* the corresponding figures were 24–28°, and above 32°, at which temp. it grew better than at 20°. The min. temp. for germination of conidia of both was 0–1°, whereas the max. for *S. obesa* was 31° and for *S. chrysanthemella* 32°; the min. R.H. for germination were 92% and 91%, respectively.

In inoculation experiments the conidia of *S. obesa* invaded *C. indicum* after 24–36 hr. The incubation period was 10–14 days, pycnidia being produced after 3–4 weeks.

S. chrysanthemella is specialized on *C. indicum* and other cultivated chrysanthemums (*C. rubellum*, *C. azaleanum*, *C. koreanum*), whereas the host range of *S. obesa* is wider (*C. parthenium*, *C. marshallii*, *C. cinnerariifolium*, *C. nivellii*, *C. corymbosum*).

Aycock (R.). **Relation of fungicidal and nematocidal bulb treatments to phytotoxicity and control of basal rot in Narcissus.**—*Phytopathology*, **49**, 1, pp. 12–16, 1 fig., 1959.

At N. Carolina State College *Fusarium oxysporum* f. *narcissi* [*F. bulbigenum*: cf. **37**, p. 358] was more effectively controlled by dowicide B (6 lb./100 gal. water for 5 min.) than by mersolite W. The narcissus var. The First proved highly susceptible both to phytotoxicity and to basal rot; King Alfred and Flower Carpet were more tolerant of both. Dowicide B caused considerable discoloration of freshly harvested bulbs, but effective control of bulb rot requires treatment to be done quickly, preferably within 24 hr. of harvesting. Basal rot in The First was reduced from 34% in the untreated to 9% with treatment the day after harvest, but damage from this early treatment affected 44 of 84 bulbs, as opposed to 20 when treatment was delayed for 7 days, and 6 after 14 days. Pre-storage dips were more effective than pre-planting dips.

McArthur (G. W. F. M.). **Cercospora leaf spot on Rhododendron (C. handelii Bubak).**—*N.Z.J. agric. Res.*, **2**, 1, pp. 86–89, 2 fig., 1959.

In Oct. 1957 rhododendron plants imported from Holland were found to be infected by a fungus identified by the Dept Agric., Wellington, as *C. handelii*, a new record for New Zealand. Angular dark brown spots occur on both sides of the leaves, varying in diam. from 3–20 mm.; they coalesce, especially marginally; petioles are occasionally infected too, and on some vars. the centres of the spots were silvery

white, owing to lifting of the epidermis. The disease is worst on the lower foliage of young stock. Under moist conditions the fungus fructifies and a greenish-brown down can be seen on the spots. Spraying with Bordeaux 6:8:100 at 14-day intervals gave satisfactory control with no damage. Affected leaves should be removed and burnt.

Yagodkina (Mme V. P.). Изучение ложной мучнистой росы Подсолнечника и разработка мер борьбы с нею. [A study of the false mildew of Sunflower and development of measures for its control.]—Кратк. Отч. н.-и. Раб. Всес. н.-и. Ин-та Маслич. Эфиромасл. Культ. ВАСХНИЛ [*Kratk. Otch. n.-i. Rab. Vsesoyuz. n.-i. Inst. Maslich. Efiromasl. Cult. VASKNIL*], *1955*, pp. 134–136, 1956. [Abs. in *Referat. Zh. Biol.*, *1958*, 19, p. 212, 1958.]

In the Krasnodar region, U.S.S.R., 76% of the plants in sunflower fields were affected by downy mildew [*Plasmopara halstedii*: **35**, p. 101]. Incidence was insignificant in fields where sunflowers had not been grown the previous 6–7 yr. The plant is invaded only through the roots; those infected when mature are symptomless but are a source of soil and seed infection. Dry treatment of the soil with fungicides considerably decreased incidence.

Joshi (N. C.). **Observations on spore germination of Sphacelotheca mcalpineae Zundel on Heteropogon contortus L.**—*Agra Univ. J. Res.* (*Sci.*), **6**, 2, pp. 19–22, 3 graphs, 1957. [Received 1959.]

At the Dept of Botany, Government College, Ajmer, spores of *S. mcalpineae* [cf. **34**, p. 790] germinated readily in water and solutions of various sugars over a wide pH range (opt. 6). A number of mineral salts proved toxic, no germination occurring in the presence of NaCl or Na_2CO_3 at 0·1%.

Halisky (P. M.), Freitag (J. H.), Houston (B. R.), & Magie (A. R.). **Occurrence of Aster yellows on Clovers in California.**—*Plant Dis. Reptr*, **42**, 12, pp. 1342–1347, 6 fig., 1958.

Aster yellows virus from natural field infections of Ladino white clover, red clover, and alsike clover [cf. **25**, p. 214] was recovered at the University of California, Berkeley, by aster leafhoppers (*Macrosteles fascifrons*), and transmitted to *Nicotiana rustica*, *Plantago major*, *Vinca rosea*, celery, and aster. The symptoms induced in the 3 clovers are described, and include floral virescence and sterility, phyllody and floral proliferation, leaf-cluster proliferation, phloem necrosis, stunting, and rosetting, often resulting in premature death.

Zwingli (W.) & Grundbacher (F.). **Weißkleeversuch mit einigen bekannten Zuchtsorten.** [White Clover test with several well-known cultivated varieties.] —*Mitt. schweiz. Landw.*, **6**, 10, pp. 155–159, 1958.

In the 1953–55 yield tests by the Institut für Pflanzenbau, Zürich, the white clover vars. Gigant, S 100, S 184, and Pathfinder were heavily attacked by *Sclerotinia trifoliorum* [**38**, p. 148] in the spring of 1954, whereas Ladino Lodigiano, Ladino Montana, Robusta, Wilka, Tammisto, and Mattenklee red clover were not.

Johnson (E. C.). **Inheritance studies, including reaction to certain foliage diseases, in Alfalfa.**—*Diss. Abstr.*, **19**, 1, pp. 12–13, 1958.

At the University of Minnesota 11 lucerne clones, single crosses (including reciprocals), the open-pollination progeny of 10, and 9 commercial vars. were tested in the field for reaction to the prevalent leaf and stem diseases and for winter-survival.

Highly significant differences in reaction to *Pseudopeziza medicaginis* [cf. **37**, p. 548 and below] were noted in all except the open-pollinated; a partial dominance

of resistance was indicated. Differences in reaction to *Cercospora zebrina* [cf. **24**, p. 61; **35**, p. 861] were significant among clones and single-cross progenies, but not among the others. Differences in reaction to *Stemphylium botryosum* [*Pleospora herbarum*] and *Pseudoplea trifolii* [cf. **38**, p. 11] were significant in all. Resistance to stem blackening behaved as a highly heritable character when *Phoma herbarum* var. *medicaginis* [**38**, p. 213] was the pathogen involved; when, however, several organisms were together responsible, parent-progeny correlations fell below significance value and heritability estimates were low.

Adams (M. W.) & Semeniuk (G.). **A comparison of predicted with realized gain from selection for leafspot resistance in Alfalfa.**—*Agron. J.*, **51**, 2, pp. 91–92, 1959.

At S. Dakota Agricultural Experiment Station, by selecting among and within lucerne families from a set of diallele crosses for resistance to leaf spot (*Pseudopeziza medicaginis*) [cf. **38**, p. 264], 12 plants from a group of 932 were selected and intercrossed at random to produce new sib families. The predicted mean level of resistance of the new population was 2·39 and the actual mean 2·06, indicating a higher resistance than had been expected.

Selection for resistance in a set of segregating families with very high family heritability and moderately high individual heritability resulted, in one generation, in the virtual exhaustion of additive genetic variance among the selected clones and their intercross family means.

Singh (R. S.) & Singh (B.). **Incidence of seedling-rot, root-rot, and wilt of Cyamopsis psoraloides under manured and unmanured conditions.**—*Agra Univ. J. Res.* (*Sci.*), **6**, 2, pp. 7–14, 2 fig., 1957. [Received 1959.]

The object of this work at the Government Agricultural College, Kanpur, India [cf. **37**, p. 103], was to determine the manner in which manuring with well decomposed farmyard manure at approx. 60 maunds/acre influenced the incidence of disease in *C. psoraloides* [cf. **31**, p. 386]. In pot experiments (1949–50) the soil was inoculated with mycelium and sclerotia of *Rhizoctonia* [*Corticium*] *solani*, scraped from agar plates, or with a spore suspension of *Fusarium caeruleum*; in the field natural soil infestation was reinforced by inoculating either fungus along the rows.

With *C. solani*, manuring did not improve low emergence, nor reduce post-emergence seedling rot, which was high: there was, however, significantly less root rot and wilt in mature plants in manured soil, which suggests that improved health resulted from the increased vigour and tissue maturity provided by better nutrition.

In soil inoculated with *F. caeruleum* emergence was nearly perfect in both manured and unmanured; seedling rot was relatively moderate in the field and low in pots, so that this fungus is apparently not the major cause of seedling rot: the lower incidence of fatal wilt in mature plants in manured plots remains to be explained. The results with mixed inoculum were similar to those with *C. solani* alone, this fungus normally predominating over *F. caeruleum*. Together they usually induced 100% mortality in pots.

Later pot tests (1950–51) were concerned with the mode of action of manure in reducing mortality. Surface-disinfected seed was sown in manured autoclaved soil inoculated with 1-month-old cultures of either fungus. *C. solani* caused fewer deaths in the manured series, this being the only difference between the treatments; again the suggestion is that reduced mortality resulted from increased plant vigour, and not from the antagonism of the soil microflora. The results with *F. caeruleum* were similar except that autoclaving the soil increased mortality, which suggests that the reduced losses in manured soils may be attributable primarily to some antagonistic action.

Bonner (R. Du B.). **The fungus flora of cattle feeds : taxonomical, cultural and ecological aspects.**—*Diss. Abstr.*, **19**, 1, p. 28, 1958.

Cattle feed samples suspected of being the source of toxins, allergenic substances, or pathological agents were obtained from the Veterinary Research Center and the Animal Nutrition Laboratory of Pennsylvania State University. Malt salt agar proved to be the best isolation medium in general, but several species of fungi not detected by this medium were isolated on Littman oxgall agar. In all, 65 species, representing 3 classes, 7 orders, and 12 families, were identified; more than one-third had histories of disease involvement in livestock. Four growth types, based upon visual estimation and dry wt., were differentiated in 10 species: (1) *Fusarium moniliforme* [*Gibberella fujikuroi*], *Mucor janssenii*, and *M. racemosus*, which developed rapidly in favourable conditions; (2) *Aspergillus fumigatus*, *Monascus purpureus*, and *Penicillium purpurogenum*, which developed over a wide range of conditions and produced moderate amounts of mycelium and spores; (3) *Alternaria tenuis*, *Chlamydomyces palmarum*, and *Cladosporium elatum*, which produced thick mycelial colonies in favourable conditions and thin growths in adverse; and (4) *Oospora lactis* [*Geotrichum candidum*], which was highly restricted. None of the fungi tested grew at 50° C., and only 3 species developed at R.H. 65%.

Rayushkina (Mme R. I.). Грибы возбудители корневой гнили сеянцев плодовых пород. [Fungi causing root rot in fruit seedlings.]—Изв. А. Н. Уз. ССР., Сер. биол. н. [*Izv. Acad. Sci. Uzbek SSR.*, Ser. biol. Sci.], *1957*, 3, pp. 51–57, 1957. [Uzbek summary. Abs. in *Referat. Zh. Biol.*, *1959*, 4, p. 205, 1959.]

At the Fruit-Berry Institute of the Uzbek Academy of Science, rotted seedling roots of apricot, plum, sour cherry, peach, and apple contained *Pythium debaryanum*, *Fusarium* spp., and *Rhizoctonia* [*Moniliopsis*] *aderholdii*. The 1st two were the most active in early spring up to the appearance of the 1st leaves, whereas the last two were responsible for the later death of seedlings. Incidence of the disease was related to the growing conditions before transplanting. Control measures are given.

Vinogradova (Mme N. V.). Рак Яблони и его географическое распространение в Белоруссии. Биологические особенности возбудителя обыкновенного рака Яблонь. [Apple canker and its geographical distribution in White Russia. Biological peculiarities of the causal agent of Apple canker.]—Тр. Гродненск. С. Х. Ин-та [*Trud. Grodno Sel.-Khoz. Inst.*], *1957*, 3, pp. 56–62, 63–73, 1957. [Abs. in *Referat. Zh. Biol.*, *1958*, 20, p. 201, 1959.]

Nectria galligena is prevalent on apple trees in the western region of White Russia (18·5–24·4%) where conditions are more humid than in the E. and where more varieties are grown together in individual orchards. The incidence in the E. is only up to 10%.

The 2nd paper is devoted to the field and laboratory studies on the physiology and morphology of the fungus.

Chamberlain (E. E.), Atkinson (J. D.), & Hunter (J. A.). **Two diseases of Plum causing distortion and internal necrosis of fruits. I. Plum fruit crinkle, a virus disease resembling Plum pox of Europe. II. Plum false crinkle, a physiological disorder of Plums.**—*N.Z.J. agric. Res.*, **2**, 1, pp. 174–183, 6 fig., 1959.

A virus disease of plums is reported by the Dept of Scientific and Industrial Research, N.Z. It was found on 1 7-yr.-old Sultan tree in the Hawke's Bay district and 2 22-yr.-old in an Auckland orchard. Symptoms first appear on fruits nearing maturity as numerous light-coloured spots or ring spots which become depressed to give a wrinkled appearance. The fruits begin to colour 10–14 days earlier than

on healthy trees and tend to drop prematurely. Scattered through the flesh are light-brown, necrotic, spongy areas, which frequently penetrate to the stone, itself normal. Such fruit is unappetizing and commercially valueless. Transient light-coloured areas appear on leaves near the base of current-year's shoots, while faint chlorotic line patterns occur on some later-formed leaves. In the nursery infected trees make normal growth, but infected orchard trees appear to lack vigour and are smaller than comparable healthy trees. The disease has been transmitted also to George Wilson and Shiro plum trees.

Although the N.Z. disease has a number of features in common with plum pox virus [**37**, p. 542 *et passim*], there appear to be certain differences such as the absence of gum-filled pockets in the flesh or dark markings on the stones in N.Z., and the fact that the N.Z. disease occurs on Japanese plum (*Prunus salicina*) and plum pox on European plum (*P. domestica*) makes strict comparison impossible. For the present the 2 diseases are regarded as different and the N.Z. disease named plum fruit crinkle. Eradication has been attempted.

In the same areas a physiological disorder, causing bold crinkling and distortion of fruits while still immature, with light, rust-coloured, necrotic areas in the flesh, has been found on the Japanese plum vars. Billington, George Wilson, and Wright's Purple. Fruit flavour is not affected. Only Billington shows foliage symptoms also —some dwarfing and faint-mottling. The condition, of which the cause is unknown, was not transmissible by grafting and is named plum false crinkle.

Richards (B. L.), Winters (W. S.), Treshow (M.), & Scholes (J. F.). **The leaf spot-leaf mottle complex of the Italian Prune.**—*Proc. Utah Acad. Sci.*, **35** (*1957–1958*), pp. 81–84, 2 col. pl., 1958.

Observations in Utah orchards over the last 4 years have proved that the spot-leaf mottle symptom of Italian prunes is associated with both leaf spot disease and leaf mottle [**32**, p. 25]. The former is primarily characterized by necrosis or quick killing of limited areas in the blade and the appearance of lesions as small, light coloured, water soaked, necrotic areas along the margin or in interveinal parts, their expansion producing definite and characteristic zonations. Later, the necrotic tissue may dry up and fall out, producing a shot hole effect. Leaf mottle involves the diminution of chlorophyll, necrosis occurring only in older chlorotic tissues. It appears at first as small, diffuse, light green or yellowish, irregular patches, seldom involving the margin, and characterized in early or late summer by diffuse greyish to purplish brown necrotic centres, which remain intact, often surrounded by a halo of the initial chlorotic tissue. Usually, leaf mottle symptoms occur before leaf necrosis develops. Both disorders are worse in hot, dry seasons.

Smolák (J.). **Nebezpečí virových chorob na Třešních.** [Dangerous virus disease in Cherry.]—*Ovocnář. zelinář.*, **6**, 4, pp. 100–101, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 3, p. 206, 1959.]

In orchards in Khodova and Prague, Czechoslovakia, a typical virus necrosis was observed in cherry; fruits are deformed with shrivelled pistils and remains of stamens at the base. The disease is not like any of the known virus diseases of cherry, but is reminiscent of tatter leaf [cf. **37**, p. 198].

Hennebert (G. L.) & Gilles (G. L.). **Épidémiologie de Botrytis cinerea Pers. sur Fraisiers.** [The epidemiology of *B. cinerea* on Strawberry plants.]—*Meded. LandbHogesch. Gent*, **23**, pp. 864–888, 1 fig., 4 graphs, 1958. [English summary.]

In greenhouse and laboratory studies at the Institut Agronomique, University of Louvain, and the Centre de Recherches de Gorsem, St-Trond, Belgium, the conidia of *Botrytis cinerea* [cf. **37**, p. 698, *et passim*] from strawberry plants matured in 6 days; even on the 12th day germination (opt. 15–20° C.) was 100% in 24 hr. The

rate of germination increased when the substrate was glass, water, cooked strawberry juice, or the epidermis of fresh, ripe strawberry. Complete germination on fresh strawberries required 3–5 hr. at the opt. temp. and 100% R.H., when germination began after 1½ hr. [cf. **30**, p. 505]. Spores placed in the open air (60–70% R.H., 15–20°) dried up and germination was much reduced, the more so by direct insolation, which killed the spores after a few days. The growth of the germ-tube and penetration ran parallel with the temp. relations of mycelial growth, the opt. being at 30°. Sporulation on lesions on the fruits occurred at 5–30° and a R.H. > 70–80%.

Floral buds were very resistant to infection; flowers were highly susceptible, especially at the end of the flowering period, and the susceptibility of the fruits increased with ripening. Fungicidal applications are unnecessary before blossoming, but spraying between 2 pickings at an interval of 2 or 3 weeks is indispensable. During rain the plants must remain wet for 4–8 hr. at 13–15° before infection can take place.

Gratch (H.). **Report to the Government of Cyprus on Olive production.**—*F.A.O. Rep.* 1006, 17 pp., 1959.

This report is based on a 1 month study tour in September, 1958. Olive leaf spot (*Cycloconium oleaginum*) [**36**, p. 537] is confined mostly to the central plain and the Plant Protection Service has established that an application of Bordeaux mixture in the latter part of Oct. and another in Jan. gives effective control.

Olive knot (*Bacterium* [*Pseudomonas*] *savastanoi*) [**14**, p. 706] is practically confined to the coastal plain of Kyrenia, where great damage is caused by leaf shedding and the drying of shoots. Pruners and pickers should not climb the trees, particularly when wearing nailed shoes which may injure the bark and permit entry of the bacterium. No budwood should be taken from affected groves.

Macrophoma [*Sphaeropsis*] *dalmatica* [loc. cit.; cf. **34**, p. 98], present in practically all districts, causes bruising and shedding of the fruit, which is rendered unsuitable for pickling.

Gambogi (P.). **Qualche notizia sull' occhio di pavone o Cicloconio dell' Olivo. Nota descrittiva.** [Information on peacock's eye or *Cycloconium* of Olive. A descriptive note.]—*Agricoltura ital.*, **58** (**13** N.S.), pp. 18–40, 1 pl., 1958. [12 ref.]

A useful account, based on the literature, of the olive disease caused by *C. oleaginum* [cf. **37**, p. 671 *et passim*], under the main headings: symptoms and damage caused; appearance and behaviour of the causal organism *in vitro* and *in vivo*; behaviour of the fungus in relation to host and environment; growth-cycle and spread; and prevention and control.

Gambogi (P.). **I sintomi delle carenze nutrizionali nell' Olivo.** [The symptoms of nutritional deficiencies in the Olive tree.]—*Agricoltura ital.*, **58** (**13** N.S.), pp. 160–167, 1 col. pl., 3 fig., 1958. [11 ref.]

Following a brief introduction by O. Verona to emphasize the importance of fertilizer applications to olive trees, the author reviews the literature and notes the chief symptoms of deficiencies of N, P, K, Ca, Mg, Cu, Mn, and B [cf. **34**, p. 465; **36**, p. 707 *et passim*].

Joshi (N. C.). **Studies on powdery mildew of Foeniculum vulgare from Ajmer. 1. Symptoms, morphology, spore germination, phenological relations and efficacy of sulphur dust against the disease.**

Joshi (N. C.). **Studies on the diseases of Foeniculum vulgare. 2. Symptoms, morphology, phenological relations and the efficacy of the Bordeaux mixture**

against Cercospora foeniculi Magn.—*Agra Univ. J. Res.* (*Sci.*), **7**, 1, pp. 87–91, 1 fig., 1 graph, 1958; **6**, 2, pp. 89–91, 1957. [Received 1959.]

In Feb. 1956 an ?*Oidium* sp. resembling that previously found on *Anethum graveolens* [cf. **36**, p. 230] was found on *F. vulgare* in some fields near Ajmer, India. The spores were incapable of germination at temps. below 16° or above 32° C., the opt. being 22-24°. Higher air temp. in Feb. and Mar. causes the disease to become epidemic, with resultant serious damage to the crop.

Dusting with S in Jan., Feb., and Mar. at 7·5, 15, and 15 lb./1·5 acre plot, respectively, reduced 60% infection in the untreated to 3%; applications of 5, 10, and 25 lb. in the same months, respectively, to each of 2 1-acre plots reduced infection to nil, as against 58 and 70% infection in the 2 untreated.

C. foeniculi is now a serious pathogen of *F. vulgare* in the Ajmer district [cf. **30**, p. 628], and observations during Jan.–Mar. indicated that the epiphytotics in 1955 and 1956 were brought on by warmer temp. (78–95° F.) with some rainfall (0·4–0·5 in.). In these 2 yr. infection in plots sprayed 4 times with Bordeaux mixture at intervals of approx. 1 month from Jan. averaged 1·2 and 0·9%, compared with 37·5 and 23·5%, respectively, in the untreated.

Bull (R. A.). **Symptoms of calcium and phosphorus deficiency in Oil Palm seedlings.** —*Nature, Lond.*, **182**, 4651, pp. 1749–1750, 1 fig., 1958.

P and Ca deficiency symptoms were successfully induced for the 1st time in pot culture in suitably treated quartz sand at the W. African Institute for Oil Palm Research, Nigeria, and are described in detail.

Kalashnikov (V. M.). Насущные вопросы борьбы с вирусными болезнями. [Urgent problems in the control of virus diseases.]—Картофель [*Potato, Moscow*], **3**, 1, pp. 23–25, 1958.

In view of the fact that the danger of virus diseases has been underestimated by potato growers in the U.S.S.R., and that there was an especially severe outbreak in 1956, the author makes a number of practical recommendations. The State Varietal Organization's directives on methods of seed testing in selection nurseries should be reviewed at once, and completely reorganized, particularly in relation to resistance to individual virus diseases and complexes, methodology for detection (unit-tuber method) and diagnosis, and determination of local distribution in the U.S.S.R. Functional disorders should be studied at the same time and the term 'potato degeneration' [cf. below] applied only to this category.

Bashkin (E. L.). О природе вырождения Картофеля. [The nature of Potato degeneration.]—Картофель [*Potato, Moscow*], **3**, 1, pp. 25–29, 1958.

Following a brief review of potato degeneration and its relation to virus diseases, the author lists the 4 classes suggested in 1945 based on 4 yr. systematic observation of 74 vars., which has now been checked by chemical tests. Simple (or basic) infections, in which only 1 foreign nucleotide can be detected are (*a*) aucuba mosaic, (*b*) mottle [potato virus X], (*c*) apical leaf roll, and (*d*) yellow top. Dual infections (2 foreign nucleotides) result in acropetal necrosis ($a+b$), top necrosis ($c+d$), mild rugose mosaic ($b+d$), spindle tuber ($a+c$), and split tuber ($a+d$). Triple infections are severe rugose mosaic ($a+b+d$), striped mosaic ($a+b+c$), leaf roll ($a+c+d$), and witches' broom ($b+c+d$). A quadruple infection gives curly stunt.

In manuring trials started in 1948–9 in the Khabarovskiĭ kraĭ, where scarcely any aphids occur on the crops, with var. Berlichingen, the best resistance to rugose mosaic followed manure (40 tons/ha.), infection in 1949 being 3·2% and in 1950 17%. NPK was slightly less favourable and when used alone infection was heaviest.

Var. Lorh sown in spring in the [Soviet] Far East is heavily infected by leaf roll, but remains healthy with summer sowing. To clarify the difference between spring

and summer sowings a series of nutritional trials was established. Aucuba mosaic infection was 72% in spring sowings, 18% in summer sowings, 52% with added $Ca(NO_3)_2$+precipitate, and 12% with $(NH_4)_2SO_4$+KCl. Percentages of apical leaf roll were 84, 17, 52, 12, respectively, and for yellow top 62, 9, 52, and 12.

The author has established (no details) sharp decreases in aucuba mosaic infection in the successive generation upon the introduction into the soil of $MgSO_4$ (early vars.) and $ZnSO_4$ (late vars.), in mottle infection with K_2SO_4 (early vars.), in apical leaf roll infection with boric acid (early vars.) and $CaCO_3$ (late vars.), and in yellow top infection with K permanganate (early vars.).

In 1949 Korenevskiĭ tubers infected by acropetal necrosis were healthy where Mg, Mg+Zn, and Mg+K were added to the soil, but were all diseased with K+Zn. These results were confirmed in 1950 with inoculated Triumph.

The author concludes that potato degeneration [cf. above] is a physiological phenomenon in which viruses assist. It should be controlled both by preservation of the plant from the influence of unfavourable external circumstances provoking degenerative changes, and by destruction of virus infections.

Bɪrecki (M.) & Gabriel (V.). К проблеме борьбы с вырождением Картофеля в центральной Польше. [On the problem of control of Potato degeneration in central Poland.]—*J. agric. Sci., Moscow*, **4**, 1, pp. 120–132, 1 fig., 6 graphs, 1959. [English, German, and French summaries.]

Some of this information from the Institute of Agricultural Methods, Fertilizers, and Soil Science, Warsaw, covering 1954–57 has been noticed [**38**, p. 272]. *Myzus persicae* is rare in central Poland and contributes little to the spread of virus Y, the presence of which is closely related to degeneration in general, but sometimes the spread of leaf roll increases degeneration.

The ratio of virus Y to leaf roll was 3·76–4·88 in Ackersegen and 0·98–1·35 in Mittelfrüh, compared with an av. of 0·16–0·35 in Germany and 0·5 in Britain, in both of which *M. persicae* predominates and leaf roll becomes more important.

Leaf roll degeneration is greater in mineral soils in Poland and less on peaty but aphid infestation may alter this. Aphid infection (including that by *Aphis frangulae* and *A. nasturtii*) may be avoided to some extent by planting so that sprouts appear after the max. summer flight of aphids.

Meier (W.). **Zum Auftreten der grünen Pfirsichblattlaus (Myzus persicae Sulzer) in Kartoffelfeldern der Schweiz.** [On the occurrence of the green Peach aphid (*M. persicae*) in Swiss Potato fields.]—*Mitt. schweiz. Landw.*, **6**, 10, pp. 145–155, 4 fig., 1958.

This is a shorter version of a paper on the relation of the aphid to potato virus distribution already noticed [**38**, p. 25].

Keller (E. R.). **Betrachtungen zur Sortenfrage im Kartoffelbau.** [Observations on the question of vars. in Potato cultivation.]—*Mitt. schweiz. Landw.*, **6**, 9, pp. 142–144, 1958.

The Eidgenössische Landwirtschaftliche Versuchsanstalt, Zürich-Oerlikon, draws attention to a new strain of virus Y [**38**, p. 221] affecting the potato crop and some tobacco vars., widely grown in many countries, including Germany. Among potato vars. from W. Germany of importance to Switzerland Frühbote, Bona, Erdgold, and Sabina are heavily infected and are being withdrawn from the official varietal list. Augusta, likewise attacked, should be kept away from seed potato propagation areas. Provided healthy seed is available, Ackersegen still remains a worthwhile var. Benedikte is recommended as a replacement for Sabina. Maritta, Voran, and Lori, the last-named to be placed on the official list, are resistant to the virus and in a healthy condition.

Orad (A. G.) & San Román (F. P. de). **Nuevas tecnicas de diagnóstico precoz del enrollado y su aplicación al control de la Patata de siembra.** [New diagnostic technique for leaf roll virus and its application in seed Potato production.]—*Bol. Pat. veg. Ent. agríc., Madr.*, **23** (*1957–58*), pp. 175–230, 2 col. pl., 6 fig., 1 diag., 1959.

A more detailed account of information already noticed [**38**, p. 328].

Anderson (R. D.). **Purple top wilt of Potatoes.**—*J. Dep. Agric. Vict.*, **57**, 2, pp. 128–134, 5 fig., 1959.

Purple top wilt (tomato big bud virus) [cf. **36**, p. 612], recognized only recently in commercial potato fields in Victoria, has not so far attained serious proportions in the chief production areas, and it is desirable to keep it in check. Field evidence indicates that Exton and Sebago are the most susceptible; Sequoia is occasionally infected, but not Kennebec. Identification of the virus in the rarer field infections of the secondary type was demonstrated (by grafting to *Datura stramonium* or tomato) in Sequoia, a hybrid seedling (V 46–4) from the Potato Research Station, and Crana, from the Gembrook area.

Abnormal sprouting [cf. **33**, p. 621] was present in 76% of Sebago seed tubers and in 82% of Exton on a Central Highlands property; both were the progeny of crops grown on the same property and known to have 1–2% purple top wilt. Tubers of each var. were used in the laboratory to cut 75 single-eye sets from 25 tubers of each; these and normally sprouted Sebago and Exton seed tubers were potted early in Dec., and analysed for virus content in early Feb. From Sebago 54 and from Exton 24 apparently healthy plants grew, from which no virus transmission was secured; nor was it from samples of 9 Sebago and 17 Exton juvenile spindly plants. Five Sebago and 1 Exton designated as purple top wilt infections later proved to be so.

Kryachko (Z. F.). Упорядочить ситему мероприятий по борьбе с Картофельным раком. [The elaboration of a system of measures for the control of Potato wart.]—Картофель [*Potato, Moscow*], **3**, 1, pp. 18–23, 1958.

Adequate data on spread and control of potato wart [*Synchytrium endobioticum*] in U.S.S.R. have now been assembled on which to base a complete review of the control system [cf. **38**, p. 273]. Recommendations herein advocated include a revision of the 'potato wart danger zone'; non-resistant vars. should be replaced by resistant, though early non-resistant vars. may be permitted on collective farms where mechanical planting and crop rotation are practised; agrotechnical methods likely to eliminate resting sporangia [**38**, p. 333]; quarantine restrictions should be limited to farms and settlements where the disease is present, no restriction being imposed on the import of potatoes from uncontaminated areas. Chloropicrin [**38**, p. 274] has proved uneconomical and largely ineffective.

Vladimirskaya (Mme N. N.). Эффективность мер борбы против рака. [The effectiveness of control measures against wart.]—Картофель [*Potato, Moscow*], **3**, 1, pp. 29–33, 4 graphs, 1958.

Work on the chemical control of potato wart [*Synchytrium endobioticum*: see above] is now in progress in U.S.S.R. A microscopic analysis of soil samples taken from the tillage layer showed that the number of sporangia/g. soil was 60–325, and at a depth of 10 cm. 50–350.

Observations at the Poshchinskiĭ Station showed little activity on the part of the fungus in the 3rd week of May. Intensive growth started in early June, when the intensity of sporangial growth rose to 50–100% at a depth of 5–15 cm., declining at the end of July and rising again in Aug. to 40–60%. At 20 cm. depth major

growth began at the end of June. At 25, 30, and 35 cm. there was little activity, but at these depths the presence of resting sporangia must be taken into account in applying chemical and cultural control measures.

Crops used for rotation [cf. **37**, p. 593] should preferably be those requiring high moisture, such as cabbages, cucumbers, and vegetables; maize, sunflower, beans [*Phaseolus* spp.] can be used, but potatoes, other Solanaceae, root, and bulbous crops should be avoided.

Khiznyak (P. A.). Наши исследования по раку. [Our researches on wart disease.]—Картофель [*Potato, Moscow*], **3**, 1, pp. 35–36, 3 fig., 1958.

This is a brief appraisal of the work [on *Synchytrium endobioticum*: see above] accomplished by the All Union, Minsk, Vilnius, and Leningrad Stations since 1948. During the 10 yr. period over 18,000 vars. were tested for resistance and over 200 chemicals for soil disinfection.

It was established that pathogenicity varies according to the soil and climatic conditions of various areas of the U.S.S.R.

The inadequacy of the 'oxidizing' and 'polyphenol' hypotheses as explanations of immunity from wart was shown. Study of the nature of resistance now follows the lines of systematic investigation of other compounds in the plant, including auxins.

X-ray irradiation (600–800 R.-units) of potato tubers produced a considerable increase in yield, while the effect of radioactive Co γ-rays (up to $1\frac{1}{2}$ million R.-units) on the fungus was to depress virulence considerably.

Dorozhkin (N. A.). Устаревшие карантинные ограничения. [Obsolete quarantine restrictions.]—Картофель [*Potato, Moscow*], **3**, 1, pp. 39–40, 1958.

This is a popular review of the problem of potato wart disease [*Synchytrium endobioticum*: cf. above] over the last decade, with special reference to White Russia. A revision of the strict quarantine measures is advocated in conjunction with the elaboration of effective control measures.

Callbeck (L. C.). **Screening of Potato fungicides in 1958.**—*Plant Dis. Reptr*, **42**, 12, pp. 1330–1332, 1958.

At the Science Service Laboratory at Charlottetown, Prince Edward Island, 10 fungicides (6 applications of each) were tested on Green Mountain potato against blight (*Phytophthora infestans*). The percentage defoliation on 15 Sept. and the percentage tuber rot were, respectively, 40 and 1·3 with 8:4:80 Bordeaux; 77 and 1·4 with Charlottetown mixture (3 maneb: 1 copper oxychloride sulphate+a little $ZnSO_4$ at 1·75lb/80-gal.); 60 and 0·7 with Lo–1499 (1 qt. ammonium ethylene bisdithiocarbamate (Rohm & Haas Co.)+1 lb. $ZnSO_4$/80); 53 and 1·4 with manzate (at 1·5/80); and 100 (on 3 Sept.) and 17·5 in the unsprayed.

Proudfoot (K. G.). **Physiologic races of Phytophthora infestans (Mont.) de Bary in Northern Ireland.**—*Nature, Lond.*, **183**, 4661, pp. 626–627, 1959.

Weather conditions conducive to rapid spread of potato blight (*P. infestans*) [cf. **36**, p. 720 and above, p. 388] in 1958 resulted in extensive damage to commercial crops, and for the 1st time seedlings at the Plant Breeding Station, Loughgall, bred from parental material carrying 1 or more of the 4 major R genes, were attacked.

On genotype $R_1R_2R_3R_4$ [**33**, p. 251] blight developed very slowly, the leaves remaining green for almost 3 weeks after the 1st lesions were recorded: at that time no blight was noted on the R_3, R_1R_3, or R_3R_4 genotypes but all, including the $R_1R_2R_3R_4$, were infected by Sept. 19.

Some seedlings possessing high foliage resistance produced badly infected tubers.

Graham (K. M.), Niederhauser (J. S.), & Servin (L.). **Studies on fertility and late blight resistance in Solanum bulbocastanum Dun. in Mexico.**—*Canad. J. Bot.*, **37**, 1, pp. 41–49, 1 map, 1959.

Experimental self- and cross-pollinations carried out on *S. bulbocastanum* [**33**, p. 315], collected extensively throughout Mexico and Guatemala, have shown that the sp. is highly self-sterile and that there are cross-sterile and cross-fertile individuals. Hybrids were produced between *S. bulbocastanum* and both *S. trifidum* and *S. pinnatisectum*. After inoculating 1,148 seedlings of *S. bulbocastanum* with the 1,2,3,4 race of *Phytophthora infestans* [**37**, p. 369] 3 types of reaction were observed: immune, with no perceptible lesions; resistant, with non-sporulating, hypersensitive lesions; and susceptible, with large sporulating necrotic lesions. Various levels of resistance were shown by the same seedlings to the Mexican and the Canadian isolates of this race, also various degrees of field resistance were exhibited by seedlings, but the tuber-propagated plants were generally field immune. *S. bulbocastanum* is considered to be a mixture of resistant and susceptible genotypes.

Protsenko (D. E.). Высокоурожайный фитофтороустойчивый сеянец. [A high yielding *Phytophthora*-resistant seedling.]—Картофель [*Potato, Moscow*], **3**, 1, p. 50, 1958.

At the Krasnorechenskiĭ State farm, Khabarovskiĭ kraĭ, 8 kg. of the seed potato No. 437 s./46, resistant to *Phytophthora* [*infestans*: cf. **37**, p. 592], from the Moscow Experimental Selection Station were planted in a plot in an infected tomato field. Haulms remained green right up to the frosts, without any signs of infection, though the surrounding tomatoes perished completely.

Popkova (Mme K. V.). Микроелементы повышают устойчивость Картофеля к фитофторе. [Micro-elements increase Potato resistance to *Phytophthora*.]—Картофель [*Potato, Moscow*], **3**, 1, pp. 37–39, 1958.

In 1955–57 at the Institute for Potato Cultivation the responses of several potato vars., including Moskovskiĭ, relatively resistant to *Phytophthora* [*infestans*], to minor elements (Cu, Mn, and B) introduced into both sandy and peat soils and applied externally were studied [**37**, p. 592].

The best results were obtained by triple spraying of the haulms with 0·02% Cu sulphate solution. Infection in Berlichingen was reduced from 44·4% to 31·2%.

At the Moscow Scientific Experimental Pluvimetric Station in 1956, $CuSO_4$ and granulated superphosphate (24 kg.+4 kg./ha.) applied by a potato planting machine reduced infection in Lorch to $\frac{1}{3}$ that of the control. Cu and Mn imparted higher resistance to Lorch than to Berlichingen. The increased resistance conferred by these elements extended into the year following their application.

Gradinarov (L.). Върху патогенитета на **Phytophthora infestans,** някои видове **Fusarium** и **Rhizopus nigricans** при Картофени клубени. [On the pathogenicity of *P. infestans*, some *F.* spp., and *R. nigricans* to Potato tubers.]—Изв. Ин-та Биол. Бълг. АН [*Izv. Inst. Biol. Bulg. Acad. Sci.*], **8**, pp. 223–242, 1957. [Russian and German summaries. Abs. in *Referat. Zh. Biol., 1959*, 3, p. 203, 1959.]

Tubers of Up-to-Date, Ackersegen, and Aquila kept at 0–6° [C.], some stored until the end of June and some harvested 15 days early, were inoculated 3 times at 19° in glass chambers. *P. infestans* did not develop well in tubers kept previously at low temp., but *Fusarium* spp. and *R. nigricans* [*R. stolonifer*] grew well. Aquila displayed normal resistance as the low temp. had a weak effect.

Ten Boer (H.). **Voortzetting van het Rizoctoniaonderzoek.** [Continuation of the *Rhizoctonia* investigation.]—*Landbouwvoorlichting*, **16**, 2, pp. 84–88, 1959.

The results of further experiments in N. Groningen, Netherlands, again demonstrated the importance of clean potato tubers in the control of *R.* [*Corticium solani*: **37**, p. 505], their use in 2 plots resulting in financial increases of Fl.900 and 1500/ha., respectively, while corresponding gains from tuber disinfection with mercurials were computed at 400 and 800/ha. In comparative tests tuber disinfection destroyed 64% sclerotia, smoking out clamps with rhizotox 'bombs' 61%, and a combination of the 2 treatments 100%.

Germination was retarded under the influence of the gas, necessitating exposure to heat before planting. No ill effects followed treatment immediately after lifting, unless the tubers were still green, when they tended to wrinkle, with occasional rotting.

Armstrong (G. M.) & Armstrong (J[oanne] K.). **The Fusarium wilt complex as related to Sweet potato.**—*Plant Dis. Reptr*, **42**, 12, pp. 1319–1329, 2 graphs, 1 map, 1958. [19 ref.]

At S. Carolina Agricultural Experiment Station 92 pathogenic isolates of *Fusarium* spp. [**37**, p. 506] from sweet potato and 28 from flue-cured tobacco [**37**, p. 459] were tested during 1945–6 on Porto Rico sweet potato by dipping roots of cuttings in the inoculum. Of the sweet potato isolates 59 were tested on Kentucky 5 Burley and Gold Dollar flue-cured tobacco by pouring inoculum onto injured roots of potted plants. All proved pathogenic to Burley, but only 23 to flue-cured tobacco. All the tobacco isolates were pathogenic to flue-cured tobacco and sweet potato and those tested on Burley tobacco were also pathogenic to it. The isolates causing wilt of sweet potato and Burley tobacco were designated as race 1 and those that were pathogenic also to flue-cured tobacco as race 2. Race 2 was isolated not only from the 2 hosts in areas where tobacco is grown but also from sweet potato in counties with no tobacco cultivation.

Additional isolates used in 1955–57 for inoculation of resistant sweet potato vars. showed decided differences in the degree of virulence regardless of race, but not on Porto Rico. There is an indication that race 1 may be more virulent than 2. Some loss of virulence among cultures was experienced and is discussed with relevant data. The host relationships of these races and those from cotton, lucerne, soybean, and cowpea are compared [cf. **29**, p. 453; **35**, p. 88].

Riggenbach (A.). **Experiments on the control of Oidium heveae.**—*Quart. Circ. Rubb. Res. Inst. Ceylon*, **34**, 3–4, pp. 58–62, 1958.

The results of this work have already been noticed [**38**, p. 98]. S dust at 12 lb./acre/round, once a week, still remains the most effective economic treatment against *O. heveae* in Ceylon.

Rossetti (V[ictoria]). **O 'oidio' da Seringuiera.** [The '*Oidium*' of Rubber.] — *Biológico*, **24**, 12, pp. 260–267, 3 fig., 1958.

Information is summarized on the symptoms, favouring factors, and control of *Oidium heveae* [map 4] in connexion with the occurrence of a restricted outbreak observed in a planting of 12-yr.-old rubber trees in Campinas, São Paulo, Brazil in Aug. 1958. A search for other hosts revealed frequent attacks of mildew [? *Oidium*] on *Euphorbia prunifolia*, but cross-inoculation experiments were unsuccessful. Precautionary measures against further spread should include notifications of outbreaks to the Biological Institute; inspection of the sites of origin of diseased plants; burning of infected material; observation of plants in the vicinity for a month, followed by applications of S dust to all plantings in the locality; and

increased vigilance in phytosanitary inspection of nurseries and plantations to discover incipient sources of infection.

Stevenson (G. C.). **Sugar Cane varieties in Barbados. An historical review.**—*Bull. Brit. W. Ind. Sug. Cane Sta.* 39 (2nd ed.), 26 pp., 1 graph, 1958. [38 ref.]

This most interesting publication includes an account of the failure of the Bourbon cane at the end of the 19th century and notes that *Colletotrichum falcatum* [*Glomerella tucumanensis*], which was associated with this event, was originally indigenous to the Eastern Tropics and was spread to the Western hemisphere with sugarcane introductions to various Botanic Stations. It may have reached Barbados with 12 vars. introduced from Jamaica in 1884, which had in turn come recently from Mauritius, and which were also distributed to other parts of the W. Indies. Such an explanation agrees with the facts of the W.I. epidemic on Bourbon cane better than any other.

Srinivasan (K. V.). **A Pythium root rot and chlorosis of Sugarcane.**—*Madras agric. J.*, **45**, 3, pp. 89–98, 1958. [*Biol. Abstr.*, **33**, 2, p. 604, 1959.]

A chlorosis caused by a nematode and a root rot due to *P. graminicola* were together responsible for considerable losses to all species of *Saccharum*; wettable S gave some control.

Bergmann (L.) & Melchers (G.). **Infektionsversuche an submers kultivierten Geweben mit Tabakmosaikvirus.** [Inoculation experiments on submerged tissue cultures with Tobacco mosaic virus.]—*Z. Naturf.*, **14B**, 2, pp. 73–76, 1959. [English summary.]

Only part of the tissues of Xanthi tobacco plants contracted infection under the above-mentioned conditions at the Max-Planck-Institut für Biologie, Tübingen, Germany [cf. **37**, p. 597], probably as a result of wounding of the cells.

Ryzhkov (V. L.) & Marchenko (N. K.). Влияние метаболитов на размножение вируса мозаичной болезни Табака в листьях невосприимчивого к вируса Табака сорта Амболема. [The effect of metabolites on the spread of Tobacco mosaic virus in the leaves of the virus-resistant Tobacco variety Ambalema.]—Воп. Вирусол. [*Vop. Virusol.*], *1958*, 1, pp. 20–23, 1958. [English summary. Abs. in *Referat. Zh. Biol.*, *1959*, 3, p. 56, 1959.]

Working on the assumption that Ambalema [**14**, p. 660] possesses substances arresting the development of tobacco mosaic virus or may be deficient in certain metabolites, the authors studied the effect of many compounds on the multiplication of the virus in Samsun and Ambalema. Some metabolites stimulated multiplication only in the first, some (folic acid) in both, but none increased the titre in Ambalema to the level of that in Samsun. It thus appeared that a deficiency of metabolites in Ambalema is responsible for its resistance.

Koelle (G.). **Versuche zur Vererbung der Krankheitsresistenz bei Tabak. 1. Mitteilung: Die Vererbung der Anfälligkeit für Rippenbräune bei der Kreuzung der Tabaksorten Havanna IIc und FO.** [Experiments on the inheritance of disease resistance in Tobacco. Note 1: the inheritance of susceptibility to vein-browning in the crossing of the Tobacco vars. Havanna IIc and FO.]—*Tabak-Forsch., Wiss. Beil. Tabak-Z.*, *1958*, 23, p. 70, 1958. [Abs. in *Ber. Inst. Tabakforsch. Dresden*, **5**, 2, p. 398, 1958.]

The studies were made on 19 progenies of the cross and their parents. In 1954 FO was free from vein-browning [str. of potato virus Y], in 1955 was slightly attacked, and in the 2 following years very severely. Havanna II, on the other hand, remained healthy until 1956 and contracted only 9% infection in 1957. The F_3

and F_4 of crosses between healthy plants made in 1957 developed only 2% vein-browning, whereas those from diseased ones were either completely infected or segregated in a ratio of 1 healthy: 2 diseased, thereby confirming the recessive nature of the inheritance of resistance demonstrated by Endemann [**37**, p. 421]: the property is transmitted by 1 factor pair.

The disparities observed in the reaction of different vars. to the virus in different years are ascribed to a change in its behaviour and not in that of the host. Support is lent to this theory by the experiments of Reisch, who planted in adjoining rows seed of the highly susceptible var. Virgin Gold collected in a number of different seasons. In the resultant crop, plants produced by seed of earlier years, before the appearance of vein-browning, contracted just as much infection as those of recent date coming from severely diseased material.

The incidence of wildfire [*Pseudomonas tabaci*] in the Havanna II × FO progenies was 78% in the 10 resistant to vein-browning, 39% in the 5 segregating, and 9% in the 4 susceptible, indicating that a predisposition to the 2 diseases is mutually exclusive.

Apple (J. L.). **Sexuality of Phytophthora parasitica var. nicotianae.**—*Phytopathology*, **49**, 1, pp. 37–43, 2 fig., 1959.

Of over 200 mono-zoospore isolates of *P.p.* var. *nicotianae* [**37**, p. 313] studied at N. Carolina State College, Raleigh, 30 produced oospores in single culture, some readily on oatmeal agar at 20° C., others erratically. Self-sterile isolates of the flue-cured strain [loc. cit.], probably antheridial only, were for the most part compatible with Burley strain isolates [cf. **34**, p. 109], and also produced oospores with a non-sporing isolate of *P. capsici* from squash; the Burley strain did not. Oospore production was extremely variable in paired cultures. Germinating oospores were abundant in 1 2-week-old culture, but no isolates were established from them.

Some isolates, at first self sterile, later produced oospores in single culture; some sectored for this property. In slide cultures at 20° oogonia began to form 4–6 hr. after mycelia of opposite strains met. Antheridial and oogonial initials were identical.

Penetration of the antheridial incept by the oogonial as described by Pethybridge [*Sci. Proc. R. Dublin Soc.*, **14**, p. 179, 1914] and others [**28**, p. 546] was confirmed.

Oogonia from *P. capsici* matings had hyaline to slightly tan walls, with oospores 30 μ diam. nearly filling the oogonium, the oospore wall being 1–2 μ thick and slightly tan. Oogonia from flue-cured × Burley and from single cultures were also hyaline or brown, but the oospores were only 24 μ diam. and did not fill the oogonial cavity.

Heggestad (H. E.) & Middleton (J. T.). **Ozone in high concentrations as cause of Tobacco leaf injury.**—*Science*, **129**, 3343, pp. 208–210, 1959.

Rubber strip tests and estimations on an ozone recorder in plots at Riverside, California, in Sept. and Oct. 1958, where tobacco leaf injury known as 'weather fleck' or 'fleck' [cf. **36**, p. 282], also a serious problem in the tobacco-producing region in Connecticut Valley, was present, indicated an abnormal conc. of ozone at times, which closely corresponded to the appearance of 'fleck'. Similar results were obtained at Beltsville, Maryland. Similarity between symptoms in the field and those produced by ozone in chambers also indicated that ozone is the probable inciting agent. Variation in leaf injury is connected with differences in stomatal action.

Lingle (J. C.), Holmberg (D. M.), & Zobel (M. P.). **The correction of zinc deficiency of Tomatoes in California.**—*Proc. Amer. Soc. hort. Sci.*, **72**, pp. 397–402, 1 fig., 1958.

This work has already been noticed [**37**, p. 251].

Georgescu (C. C.), Ene (M.), Petrescu (M.), Ştefănescu (M.), & Miron (V.). **Bolile şi dăunătorii pădurilor. Biologie şi combatere.** [Diseases and pests of trees. Biology and control.]—638 pp., 41 col. pl., 442 fig., Bucharest, Editura Agro-silvică de Stat, 1957.

The part dealing with fungus and bacterial diseases (pp. 94–342) is preceded by a general survey of symptoms and damage, and ends with a bibliography of 256 ref. The trees are dealt with individually by species, the diseases being described in turn and then keyed out. The section on protection (pp. 541–615; 34 ref.) is concerned mostly with machinery. Some of the pathogens not recorded in Romania on C.M.I. maps are *Fomes annosus* [map 271] on *Abies*, spruce, Douglas fir [*Pseudotsuga menziesii*], and pine; *Phomopsis pseudotsugae* [320] and *Rhabdocline pseudotsugae* [52] on Douglas fir; *Phytophthora syringae* [174] on lilac; and *Xanthomonas juglandis* [133] on walnut.

Krstić (M.). **Nezabeležene fitopatološke pojave n rasadnicima i šumama Srbije.** [Unnoted phytopathological phenomena in nurseries and forests in Serbia.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1958*, 45, pp. 75–79, 2 pl., 1958. [English summary.]

Among the more important pathogens recorded by the Faculty of Forestry, Beograd, for the 1st time in Yugoslavia are *Discula platani* on *Platanus orientalis* and *Phomopsis pseudoacaciae* on *Robinia pseudoacacia*, both causing a die-back of many young plants, and *Actinothyrium marginatum* attacking a dense stand of *Pinus nigra* previously damaged by bark beetles. Other records are *Phomopsis sophorae* in *Sophora japonica*, *Cytospora* [*Valsa*] *ambiens* on white mulberry, *Sclerophoma magnusiana* on *Pinus peuce*, *Cladosporium herbarum* on *P. strobus*, *Gloeosporium catalpae* on *Catalpa speciosa*, *Phyllosticta prunicola* on *Prunus serotina*, *Phyllosticta fraxini* on white ash (*Fraxinus americana*) seeds, and *Ganoderma lucidum* on roots of *R. pseudoacacia*.

Faber (H.). **Pflanzenschutz in Baumschulen.** [Plant protection in tree nurseries.] —*Forst- u. Holz*, **14**, 3, p. 54, 1 fig., 1959.

Control of [unspecified] fungal diseases and insect pests with the many effective remedies now available has become part of the ordinary routine in nurseries in the Pinneberg district of Schleswig-Holstein, which is stated to be the largest continuous area devoted to this purpose in the world. The export of planting material has greatly increased since the turn of the century, 42 countries now being supplied from local establishments. Other important functions include the greenhouse testing of stocks and grafting material for virus infections as a preliminary to the breeding of healthy plants.

Davidson (R. W.). **Additional species of Ophiostomataceae from Colorado.**—*Mycologia*, **50** (*1958*), 5, pp. 661–670, 1959.

In further work [cf. **34**, p. 827] 4 species were isolated from *Abies lasiocarpa*. *Ceratocystis nigra* Davidson and *C. brunnea* Davidson are described as new, the former from canker-like streaks in the bark or associated with bark beetle galleries (*Dryocetes confusus* and other spp.), the latter from galleries. *C. penicillata* was isolated from bark of dead or dying trees or found in galleries; *C. minor* was obtained only from bark or logging wounds.

C. perfecta Davidson, *C. tenella* Davidson, and *C. vesca* Davidson are described from secondary bark beetles associated with *Dendroctonus engelmanni* and *Ips pilifrons* in *Picea engelmannii*.

On freshly cut aspen (*Populus tremuloides*) sapwood *C. moniliformis* fruited and on recently killed trees *C. brevicollis* Davidson was collected where it grew in association with ambrosia beetles (*Trypodendron retusus*).

Sheneman (J. M.) & Costilow (R. N.). **Identification of microorganisms from Maple tree tapholes.**—*Food Res.*, **24**, 1, pp. 146–151, 1 graph, 1959.

Yeasts and moulds have already been shown by Naghski & Willits (*Appl. Microbiol.*, **3**, pp. 149–151, 1955) to be involved to some extent in the premature stoppage of maple [*Acer*] sap flow [see below]. At the Michigan Agricultural Experiment Station during 1954 and 1955, 446 anascosporogenous, non-fermentative yeast cultures were isolated. Of the 412 studied intensively, 84 (20·4%) yielded (?) *Trichosporon pullulans*, 75 (18·2) *Rhodotorula glutinis*, 48 (11·6) *Candida* sp., 42 (10·2) *Torulopsis aeria*, 36 (8·7) *Cryptococcus laurentii*, 32 (7·8) each *C. diffluens* and *C. albidus*, 23 (5·6) *Candida curvata*, and 8 (1·9) *T. candida*, while the remaining 32 (7·8) were unclassified.

Among the 370 mould cultures 83 (22·4%) were spp. of *Penicillium*, 60 (16·2) *Phoma*, 36 (9·7) *Hormodendrum*, 26 (7) *Fusarium*, 16 (4·4) *Alternaria*, 13 (3·5) *Cephalosporium*, 11 (3) *Rhizoctonia*, 10 (2·7) *Aspergillus*, 6 (1·6) *Coniothyrium*, while 109 (29·5) failed to produce fructifications.

Sheneman (J. M.), Costilow (R. N.), Robbins (P. W.), & Douglass (J. E.). **Correlation between microbial populations and sap yields from Maple trees.**—*Food Res.*, **24**, 1, pp. 152–159, 3 graphs, 1959.

It was demonstrated by inoculation tests with a number of bacteria and yeasts and 1 mould (*Penicillium* sp.) that any organism capable of growth in tapholes would cause stoppage of sap flow [see above], presumably through physical occlusion of the vessels.

The application of an 'aseptic' tapping method similar to that of Naghski & Willits resulted in an increased yield over that obtained by the regular process, the correlation coefficient of 0·66 being determined as significant at the 1% level.

Of several methods tested for the control of microbial development in the tapholes, the most promising was the insertion of paraformaldehyde (trioxymethylene) in agar pellets, but its practicability cannot be assessed pending further studies on the elimination of the chemical from the sap during concentration to syrup.

Käppel (M.) & Wartenberg (H.). **Der Formenwechsel des Actinomyces alni Peklo in den Wurzeln von Alnus glutinosa Gaertner.** [The change of form of *A. alni* in the roots of *A. glutinosa*.]—*Arch. Mikrobiol.*, **30**, 1, pp. 46–63, 4 pl., 1958.

A detailed examination was made at the Institut für Allgemeine Botanik, Frederick Schiller University, Jena, of the alder endophyte [**31**, p. 36], considered to be [the aerobic] *Actinomyces alni*. It enters through the root-hairs, in which after a few days non-septate hyphae, enveloped in an increased conglomerate of host-plasma, were detected by differential staining. The hyphae grow from cell to cell in the root cortex parenchyma. As the non-septate hyphae become septate, the plasmodium-like mass is decomposed. The main, septate hyphae have no such envelope, are clearly visible, and develop numerous laterals. The ends of the latter swell into vesicles incorporating the main hypha. The vesicles are absorbed by the host, only empty integuments remaining, but this may be inhibited by the appearance of bacteroids. Increasing the N-nutrition of the host increased the formation of vesicles, at the same time reducing the formation of bacteroids, which arise from the main hyphae and are embedded in an expandable substance.

The bacteroids are a stage in the development of the endophyte and are a particularly infectious form. It is probable that in nature they are the sole infectors.

Oganova (Mme E. A.). Болезни стволов Ясеня в зависимости от лесорастительных условий. [Diseases on Ash trunks depending on the forest growing conditions.]—Лесн. Хоз. [*Lesn. Khoz.*], **11**, 6, pp. 41–44, 3 fig., 1958.

In the Tellermanski Forest, U.S.S.R., 35% of the ash trees growing on sandy and

saline soils were found to be affected by trunk cankers, responsible for 14% loss. Incidence in dark-grey soil was much lower. The most severe and widespread are bacterial canker [*Pseudomonas savastanoi* f.sp. *fraxini*: **38**, p. 281; map 135] and scab (*Endoxylina stellulata*) [cf. **37**, p. 602], the conidial state of which, isolated from lesions, is named *Libertella fraxinea* Oganova [no Latin diagnosis]. It produces light orange crescentic spores in the bark which emerge when mature. Rot in the trunks of trees infected by scab reached to a height of several m.

Polyporus hispidus and *Litschaueria* cause severe rotting of the trunks and are very widespread. *Armillaria mellea* and *Lentinus tigrinus* also cause rotting.

Cutting out infected parts and strict seed quarantine are necessary against *E. stellulata*. Planting should not be done on dry slopes or in saline soil.

Koleva-Shekutkovska (Milosija). Опасноста која му прети на нашите Кестенови шуми. [A danger to Chestnut forests in our country.]—Шумарск. Прегл. [*Šumarsk. Pregl.*], **5**, 3–4, pp. 35–40, 1957. [English summary. Abs. in *Referat. Zh. Biol., 1958*, 20, p. 197, 1958.]

Strict supervision, prophylactic measures, and methods for the control of chestnut canker (*Endothia parasitica*) are recommended, as it is suspected that the disease is latent in Macedonia. Included in the distribution is Caucasus, U.S.S.R. [map 66].

Polozhentsev (P. A.) & Negrutskiĭ (S. F.). К характеристике больного и здорового дерева Каштана съедобного. [On the characteristics of infected and healthy edible Chestnut trees.]—*Monit. Jard. bot. Tiflis, 1957*, 64, pp. 63–69, 1957. [Abs. in *Referat. Zh. Biol., 1958*, 21, p. 216, 1958.]

A study of the physiology of *Endothia parasitica* [map 66] on chestnut in the forest of Georgia, U.S.S.R., with an investigation of the effect of the fungus on infected trees.

Akhundov (T.). Бурая пятнистость Фундука и меры борьбы с ней. [Brown spots on Hazel and measures for its control.]—Соц. С.-Х. Азерб. [*Sotsial. Sel.-Khoz. Azerb.*], *1958*, 1, pp. 54–56, 1958. [Azerbaijan and Russian. Abs. in *Referat. Zh. Biol., 1958*, 19, p. 213, 1958.]

In 1955 *Cylindrosporium coryli* [cf. **34**, p. 556] was noticed for the 1st time on *Corylus* sp. in Azerbaijan, damaging mainly the leaves, by causing circular or angular dark-cinnamon spots. The fungus overwinters on fallen leaves, which must be destroyed. When a mixture of 1% dinitrorhodanebenzene+Cu oxychloride+ 0·7% zineb was applied good control was obtained.

Primakovskaya (Mme M. A.). О некоторых грибах возбудителях некрозов Ильмовых пород. [On some fungi causing necrosis of Elm trees.]—Сообщ. Инст. леса [*Soobshch. Inst. Lesa*], *1958*, 10, pp. 50–61, 1958. [Abs. in *Referat. Zh. Biol., 1958*, 20, p. 197, 1958.]

Descriptions are given of the biology of the following fungi and the damage they cause to elm trees in the steppe, Darkul'ska Station, and in the Tellerman forests: *Steganosporium compactum*, *Cryptosporella hypoderma*, *Dothiorella ulmi*, *Camarosporium cruciatum*, *Diplodia melaena*, *Cytospora* [*Valsa*] *ambiens*, *C. nivea*, *Tubercularia vulgaris*, *Coniothyrium insitivum*, *Coryneum intermedium*, *Hendersonia ulmea*, *Macrophoma leucorhodia*, and others not identified to species.

Šutić (D.) & Tešić (Z.). **Jedna nova bakterioza Bresta izazivač Pseudomonas ulmi, n.sp.** [A new bacteriosis of Elm caused by *P. ulmi*, sp. nov.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1958*, 45, pp. 13–25, 2 pl., 1958. [French summary.]

The disease, described from the Faculty of Agriculture, Zemun, Yugoslavia, causes

the death of infected trees in wet seasons. The leaf spots are dark brown, producing necrosis when massed; those on the stems are oblong and purple. *P. ulmi* is Gram—, not acid-fast, motile, 1·2–2·8 × 0·2–0·7 μ, non-spore forming, capsulate, and forms on plain agar round colonies, shining, pale beige, with a slightly fluorescent base, and on potato agar white colonies. Gelatine is not dissolved, milk is unchanged except for reduction of methylene blue, ammonia and smaller amounts of H_2S, are produced but no indole, and nitrates are not reduced. Acid but no gas is formed from arabinose, xylose, glucose, galactose, mannose, saccharose, raffinose, glycerin, and mannite; none from lactose, maltose, or dextrin.

The pathogen resembles *P. melophthora* [**11**, p. 67] but failed to infect apples.

The disease is widespread near Beograd and in some other regions but has not been reported from Slovenia.

Leontovyč (R.). **Napadnutie jednotlivých klonov Topolov houbou Melampsora allii-populina Kleb. v selekčnej velko škôlke Gabčíkovo roku 1956.** [Infection of isolated branches of Poplar by the fungus *M. allii-populina* in the selection nursery of Gabčíkovo in 1956.]—*Lesn. časop.*, **4**, 1, pp. 30–45, 1958. [Russian and German summaries. Abs. in *Referat. Zh. Biol., 1959*, 3, p. 200, 1959.]

This is the 1st record of *M. allii-populina* in Czechoslovakia. Nos. 109, 214, and 501 of *Populus italica*, and also *P. marilandica*, *P. nigra*, *P. fremontii*, and *P. gelrica* appeared the most resistant. Frost created favourable conditions for the spread of the disease. Eradication of alternate hosts, use of fungicides, and planting resistant vars. are recommended.

Ibragimov (I. A.). К вопросу об усыхании культур Тополей в Башкирской АССР. [On the question of Poplar withering in the Bashkir A.S.S.R.]—Тр. Башкирск. с.-х. Ин-та [*Trud. Bashkir sel.-khoz. Inst.*], **8**, 2, pp. 265–278, 1957. [Abs. in *Referat. Zh. Biol., 1959*, 1, p. 213, 1959.]

The withering of poplar in Bashkir was noticed in 1951–2, coinciding with low rainfall. Among 16-yr.-old Balsam poplars it was found that 37·3% of thinner trees in thickly growing parts die; losses of Chinese poplar are 100% in many places. From the bark of withering and dying trees 16 fungi and 2 bacteria were isolated, with *Cytospora chrysosperma* [*Valsa sordida*] predominant. In inoculation tests the fungus caused canker, invading through wounds, when the trees were physiologically weak. Balsam poplar is the most resistant followed by a Chinese var.

Vörös (J.). **A Septogloeum populiperdum Johannes-ról.** [On *S. populiperdum.*]—*Bot. Közl.*, **47**, 3–4, pp. 349–350, 1956. [German summary.]

A comparison (in Budapest) of *S. populiperdum* Moesz & Smarods (*Ung. bot. Bl.*, **31**, pp. 41–42, 1932) on *Populus deltoides* with *S. populiperdum* Johannes [**30**, p. 5] on other *P.* spp. showed them to differ. The acervulus of the former is on the upper leaf surface and 120–250 μ diam., the conidia being 1–3 septate and 15–45 × 5–7·5 μ, while that of the latter is usually on the lower surface and 1 mm. diam., with shorter conidiophores and conidia 2–7 septate and 32·4–43·5 (—96) × 6·4–8·2 μ. Johannes' fungus is considered different also from 5 other related *S.* spp. and is therefore given a new name—*S. johannesii* Vörös.

Angerer (J.). **Eine bemerkenswerte Pilzgesellschaft auf Pappelholz.** [A noteworthy fungal association on Poplar wood.]—*Ber. bayer. bot. Ges.*, **32**, pp. 141–142, 2 pl., 1958.

In a 3-yr. study of the succession of larger fungi on a large number of young poplar trees which had been uprooted and left to rot, *Merulius papyrinus* and *Trametes lactea* were found to be dominant, both being very common and present on both branches and twigs. Significantly less frequent was *Stereum spadiceum*, on branches,

twigs, and root stocks. A further 9 spp. are recorded, 7 of them well known: it was not unusual for up to 7 spp. to occur on a sapling only 1–1·5 m. long.

Bakshi (B. K.). **Diseases and decays of conifers in the Himalayas.**—*Indian For. Rec.*, N.S. Myc., **1** (*1955*), 6, pp. 71–89, 4 pl., 12 fig., 1957.

This paper has already been noted [cf. **35**, p. 405].

Sato (K.), Shoji (Ts.), & Ota (N.). **Studies on the snow molding of coniferous seedlings—I. Gray mold and sclerotial disease.**—*Bull. For. Exp. Sta. Meguro* 110, pp. 1–153, 16 pl., 3 fig., 6 graphs, 1959. [Japanese. Abs. from English summary, pp. 145–153. 159 ref.]

Snow mould is the most destructive disease of various coniferous seedlings in regions of deep snowfall in Japan and the resultant damage entails considerable losses. In an extensive investigation at the Akita Branch Station snow mould caused by *Botrytis cinerea* and *Sclerotinia kitajimana* (the chief causal agents of the disease in Tohoku and Hokkaido) was studied on sugi (*Cryptomeria japonica*) and *Pinus densiflora* [cf. **37**, p. 744]. One-yr.-old seedlings were more susceptible than older, and especially susceptible were autumn transplants or heeled-in stocks, when thus deprived of much of their root system. Damage to seedlings transplanted before the dormant period was very slight. Both fungi developed on sugi seedlings about 30 days after snow cover.

As hosts of *B. cinerea* under snow, 31 spp. (14 families) of conifers and weeds are listed. Other hosts naturally infected by *B. cinerea* were Japanese larch, *P. radiata*, *Sequoia sempervirens*, *Pseudotsuga taxifolia* [*P. menziesii*], and *Abies* spp.

Of 7 plant spp. inoculated with *S. kitajimana*, sugi, *Pinus densiflora*, and Chinese milk vetch (*Astragalus sinicus*) were very susceptible, whereas *Chamaecyparis obtusa* and *Picea hondoensis* were resistant, and rye very resistant. Of the weeds infected under snow, *Gnaphalium multiceps* and *Lactuca stolonifera* were very susceptible. On inoculation, 68 weed spp. (33 families) were found to be hosts.

Inoculated to sugi seedlings under snow, *S. trifoliorum* was very virulent; *S. libertiana* [*S. sclerotiorum*] and *S. graminearum* were not virulent at all. The symptoms of infection by *S. trifoliorum* strongly resembled those caused by *S. kitajimana*. The 3 spp. were alike in cultural characters.

B. cinerea, and particularly *S. kitajimana*, grew better in the dark than in light. Conidia of *B. cinerea* germinated at 0–25° C. (opt. 15–20°), but not at 30°. Germination in a Petri dish under snow was better than in contact with snow. Opt. temp. for mycelial growth of *S. kitajimana* was approx. 20°; at 30° it was very slow. The mycelia of *B. cinerea* and *S. kitajimana* grew well on potato agar under snow. When kept at 0° for 14 days before transference to this medium, they grew more vigorously than when untreated. The difference was remarkable in *S. kitajimana*.

Sclerotia of *B. cinerea* were killed by 10 min. in water at 50°; *S. kitajimana* by 10 min. at 55°. The viability of the mycelium was not impaired by continuous exposure in midwinter to below —7° for several successive days.

One-sided aversion occurred between *B. cinerea* and *S. kitajimana* on potato agar, but not between 2 strains of the former. *S. kitajimana* attacked its hosts only under snow. No conidia of *B. cinerea* developed on agar at 0° in 50 days, but they grew in profusion under snow on old colonies which had been cultured for 10 days at 20°. Sclerotia of *S. kitajimana* caused more severe infection of *C. japonica* seedlings than mycelium.

Both fungi, especially *B. cinerea*, grew vigorously on soils to which were added powdered bracken and Japanese larch and chestnut leaves.

B. cinerea was more widely distributed than *S. kitajimana* in the Tohoku district. In plantations trees were affected only by *B. cinerea*.

Damage to conifer seedlings by snow mould was greatest during years of heaviest

snowfall, and on flat ground, in the vicinity of streams, or in depressions where snow melted later than on slopes. A soil moisture content of 55% was the most favourable for the growth of the fungi. The damage to sugi seedlings from *S. kitajimana* was comparatively serious when beds were inadequately drained at the time when the snows melted.

On clay both fungi attacked severely. Sugi seedlings on light loam, given a mixed inoculum of the 2 fungi, were very severely attacked by *B. cinerea*, though the other produced no infection.

Without snow *B. cinerea* was more virulent to several tree spp. than was *S. kitajimana*, but under snow the reverse was true.

P and K deficiency in the soil made sugi seedlings susceptible to *B. cinerea* under snow, and this was enhanced by increasing N. Seedlings under warm conditions were also highly susceptible when supplied with complete fertilizer. Resistance appeared to have been imparted to stocks through control of excessive growth in the early autumn by root pruning. Severe damage under snow was suffered by seedlings which had been covered with bamboo grass (*Sasa paniculata*), rice straw, or fallen oak and maple leaves to prevent injury from frost before snowfall. Wet mulches on seedling beds tended to favour the spread of both fungi. Seedlings with apical injuries were susceptible to *B. cinerea*; disinfection with Bordeaux mixture showed little promise of effective control.

Seedlings treated with MH-30 [**36**, p. 438] and root-pruned were resistant to both fungi, especially when the treatments were simultaneous. The mycelial growth of *B. cinerea*, *S. kitajimana*, and *Rhizoctonia* [*Corticium*] *solani* [**38**, p. 313] was checked by 0·3% MH-30 solution. Conidial germination of *B. cinerea* was considerably checked in 0·05%, and inhibited in 0·1%.

When sugi transplants were temporarily planted on 13 Sept., some were damaged by *Pestalotia shiraiana* [**37**, p. 744] and *Fusarium* sp. in the autumn. The remainder, however, were highly resistant to sclerotial disease under snow. Stocks temporarily planted on 7 Oct. which rooted before snowfall, became resistant to the disease. Those replanted on 12 Nov. were most susceptible, and those on 13 Dec. moderately resistant. The resistance of seedlings which had been temporarily planted in the autumn was found to be remarkably less under snow.

Ceresan, uspulun, mercron, Sankyo Cu-Hg dust, ruberon dust, and strong riogen dust were very effective in checking the growth of the fungi. Spraying and dusting with Bordeaux, ceresan diluted with slaked lime, and Sankyo Cu-Hg dust in late autumn were very effective against *B. cinerea* on sugi. Against *S. kitajimana*, ceresan diluted with slaked lime, Bordeaux, Bordeaux+upsulun, and Sankyo-Bordeaux were very effective. Bordeaux was harmful to *P. densiflora* and Japanese black pine (*P. thunbergii*) seedlings. The former especially suffered severe loss, though addition of $ZnSO_4$ to the Bordeaux reduced injury. Fumiron solution was both effective and harmless. TFI-A solution was effective to a considerable extent, though more or less injurious to the seedlings. When seedlings sprayed with Bordeaux were protected from the snow by wooden boxes, chemical injury was lessened. No injury was sustained by seedlings kept in the room or incubator. Riogen dust, Sankyo-Bordeaux dust, and ceresan diluted with slaked lime proved effective dusting materials.

Ziller (W. G.). **Studies of western tree rusts. IV. Uredinopsis hashiokai and U. pteridis causing perennial needle rust of Fir.**—*Canad. J. Bot.*, **37**, 1, pp. 93–107, 3 pl. (24 fig.), 1 diag., 1959.

Field observations and inoculation experiments in Victoria, B.C., showed that perennial needle rust of fir (*Abies* spp.), attributed to *Peridermium pseudobalsameum*, is caused by *U. hashiokai* and *U. pteridis* which complete their life cycles, as described for the 1st time, on bracken (*Pteridium aquilinum*) [cf. **9**, p. 571; **28**,

p. 605]. The 2 spp. are indistinguishable in life history, host relationship, and morphology of most of the spore states, but differ in geographical distribution and the morphology of the uredospores. Which of the 2 *U.* spp. is in fact the perfect state of *Peridermium pseudobalsameum* remains unknown. The development of the spore stages of the 2 spp. on fir is unusual, especially the long maturation period of the aecia, which develop from localized perennial mycelium 4 months after infection in *A. lasiocarpa* and after 11 on *A. grandis*. *U. aspera* proved to be a later synonym of *U. hashiokai*.

ZILLER (W. G.). **Studies of western tree rusts. V. The rusts of Hemlock and Fir caused by Melampsora epitea.**—*Canad. J. Bot.*, **37**, 1, pp. 109–119, 2 pl. (20 fig.), 1 diag., 1959.

Inoculation experiments in Victoria, B.C., showed that the needle rust fungus (*Caeoma dubium*) of hemlock (*Tsuga* spp.) is the aecial state of a new race of *Melampsora epitea* for which the name *M. epitea* Thuem. f.sp. *tsugae* Ziller is proposed. This race differs morphologically from most spp. of *M.* and from some races of *M. epitea*, though it is indistinguishable from *M. abieti-capraearum* (regarded as another race of *M. epitea*) except by the aecial hosts. An account of the taxonomy, morphology, and life history of the new race is presented.

GREMMEN (J.). **Een afsterven van Pinus-soorten in Nederland en de vermoedelijke oorzaak.** [A die-back of *Pinus* spp. in the Netherlands and the probable cause.]—*Ned. Bosb. Tijdschr.*, **30**, 7, pp. 199–208, 2 fig., 1 diag., 1958. [English summary.]

Since 1933, groups of 20–50-yr.-old pines, especially *Pinus nigra* var. *austriaca*, have been dying back in the central (Veluwe) and northern parts (Friesland), both on very dry and wet soils. The newly formed shoots are abnormally short and the needles, beginning with those on the current year's growth, gradually turn yellow to brown and red-brown. They often bear apothecia and pycnidia of *Scleroderris lagerbergii*, the perfect state of *Brunchorstia pinea* [but cf. **34**, p. 325]. At this stage bluish-black spots, frequently exuding resin, may be observed on the disintegrating root system. A greyish-white or yellowish mycelium develops on both thick and slender roots, and the course of the long, repent hyphae can be followed between the outer bark scales. Minute, circular, stromatoid structures are frequently detected in longitudinal section of the roots. From the roots the mycelium penetrates the base of the tree, ramifying between the outer bark scales and killing the cortex and cambium. Diseased trees invariably occur along paths and infection extends year by year to neighbouring trees, spreading either on one or both sides of the path in a roughly circular area.

Rhizina undulata [*R. inflata*: cf. **12**, p. 798; **36**, p. 793] was constantly observed in association with dying trees at the edge of a group, its mycelium spreading radially through the soil. Newly formed apothecia were found only on the periphery of such plots, i.e., the zone invaded in the previous year. They develop either on the ground, frequently in connexion with dead roots, or on fresh or decayed stumps. The fungus commonly colonizes burnt sites, developing 1–2 yr. after a fire. It was seen on a visit to Mannheim, Germany, in 1957, killing large numbers of 2-yr.-old Scots pines (*P. sylvestris*) on a reafforested area of 5 ha. destroyed by fire in 1955.

The ascospores of *R. inflata* germinated most freely on malt agar, but 0·4% yeast agar was the best medium for growth from apothecial tissue, which may be subcultured, e.g. on cherry agar, wheat kernels, or sterile soil. The originally white mycelium later turns pink, while in old cultures red- or yellow-brown hyphal strands are formed, closely resembling plant rootlets.

Brief directions are given for the construction of trenches to prevent the spread

of the die-back. [This paper also appears as *Korte Meded. Sticht. Bosbouwproefst 'De Dorschkamp'* 35, 1958.]

Tominaga (Y.). **Cytogenetic studies of the hymenomycetous fungi I. On the spore germination and mycelium division of Armillaria matsutake Ito et Imai, Japanese Pine mushroom.**

Uehara (K.) & Fujioka (Y.). **On the effect of vitamin and matsutake-ol to the growth of Armillaria matsutake.**

Yamauchi (K.) & Yokohata (A.). **Chemical studies on the growing of matsutake, Japanese Pine mushroom (Part 1). On the physical and chemical properties of 'Shiro' matsutake-growing-soils.**—*Bull. Hiroshima agric. Coll.*, **1**, 1, pp. 1–5, 3 fig.; pp. 6–9, 1 diag., 3 graphs; pp. 10–14, 1958. [Japanese. Abs. from English summaries.]

Spore germination of *A. matsutake* [cf. **32**, p. 637] on Hamada's medium at 24° C. took more than 5 days and in the cell division of secondary mycelium clamp connexions formed.

The growth of the fungus was promoted remarkably by biotin and vitamin C, and to a lesser degree by folic acid and vitamin B_1, whereas vitamins B_2, B_6, and B_{12} exerted no visible effect and matsutake-ol (essence of the characteristic odour) and sporophore extract induced severe inhibition.

Results are given of comparative studies of the fungus in different soils.

Danielsen (A.). **Merulius lacrymans (Wulf.) Schum. i friluft i Bergen, Norge.** [*M. lacrymans* in the open air at Bergen, Norway.]—*Friesia*, **6** (*1957–58*), 1–2, pp. 1–3, 1 fig., 1959. [English summary.]

Fruit bodies were found near a hole in the wall of a brick building infested by the fungus in the Botanical Garden in Oct. 1953 [cf. **34**, p. 420]. The formation of dry rot fructifications outdoors appears to be a rare occurrence, at any rate in Norway.

Czaja (A. T.) & Pommer (E. H.). **Untersuchungen über die Keimungsphysiologie der Sporen holzzerstörender Pilze : Merulius lacrymans und Coniophora cerebella. I. Die Sporenkeimung in vitro.** [Studies on the physiology of germination of the spores of wood-destroying fungi: *M. lacrymans* and *C. cerebella*. I. Spore germination *in vitro*.]—*Qual. Plant. Mater. veg.*, **5**, 3, pp. 209–267, 6 fig., 1959. [English summary. 42 ref.]

At the Botanisches Institut der Technischen Hochschule, Aachen, Germany, spores of *M. lacrymans* [**33**, p. 329; **37**, p. 323], taken mechanically from dry fruit-bodies of different ages ($\frac{3}{4}$–20 yr.), were stimulated to germinate by mixtures of very low conc. growth substances (vitamins of the B_1 group) and organic acids of the Krebs' cycle. Culture filtrates of *C. cerebella* [*C. puteana*: loc. cit.] and *Rhizopus nigricans* [*R. stolonifer*] (20 days in 1% malt extract) acted as germination stimulators of *M.* spores, also an aqueous extract of wood decayed by *C. puteana*. A similar effect was obtained with culture filtrates of *Cladosporium cellare*, *C.* sp. (*Hormodendrum* group), *Trichoderma viride*, *Penicillium* spp. I and II, *Rhodotorula* sp., *Ophiostoma* sp., *Saccharomyces cerevisiae*, and *Exobasidium azaleae* isolated from moist timber in buildings and cultured for 20–50 days in 1% malt extract+1% citric acid. These fungi produce the effect of a vitamin of the B_1 group, while *P.* spp. III and IV, isolated in the same manner from moist timber, stimulate under similar conditions the *M.* spores only when 100 μg.% vitamin B_1 is added, thus acting like organic acids. Aqueous extracts from new, unused spruce stop the germination of *M.* spores under normal favourable conditions, whereas extracts from old timber, in use for more than 50 yr., did not.

Basidiospores from fresh fruit-bodies of *C. puteana* germinate easily on the usual culture media; those from dried fruit-bodies are stimulated to germinate by

mixtures of vitamins (B_1 group) and the same organic acids which act favourably on spores of *M. lacrymans*.

Danielsen (A.). **Pholiota squarrosa Müll. og Trametes gibbosa (Pers.) Fr. på bøgevalser i uldvarefabrikk ved Ålesund, Norge.** [*P. squarrosa* and *T. gibbosa* on Beechwood rollers in a woollen goods factory near Ålesund, Norway.]—*Friesia*, **6** (*1957–58*), 1–2, pp. 4–6, 1 fig., 1959. [English summary.]

A constant temp. of 22° C. and R.H. of 65% in the factory were nearly opt. for *P. squarrosa*, common in Norway, and *T. gibbosa*, found only in a few localities in the S.W. Probably the rollers were already infected (1 with each fungus) before despatch from Germany 2 yr. earlier.

Pospelov (A. G.) & Chagorova (Mme R. M.). Дереворазрушающие домовые грибы и меры борьбы с ними. [Wood-destructive house fungi and measures for their control.]—29 pp., 3 fig., Academy of Science, Kirghiz S.S.R., Frunze, 1957. Roubles 0.60.

This is a popular scientific booklet issued under the auspices of the Institute of Botany, Kirghiz Academy of Sciences, for the guidance of non-specialists in building and allied fields in dealing with the problem of infected timber. In recent years, wood-destructive fungi have occurred widely in Kirghizia due to the use of poor quality, infected, and green timber in building and making repairs, and failure to apply prophylactic control measures or chemical treatments.

Descriptions are given of the principal fungi involved [cf. **37**, p. 563]: *Serpula* [*Merulius*] *lacrymans*, *Coriolus vaporarius* [*Poria vaporaria*], *Fibuloporia* [*P.*] *vaillantii*, and *Coniophora cerebella* [*C. puteana*].

Details of the prophylactic and chemical control measures advocated are given.

Phillips (E. W. J.) & Savory (Cynthia A.). **The effect of fungal decay on the benzidine test for distinguished heartwood and sapwood in Pine.**—*For. Prod. J.*, **8**, 5, pp. 157–159, 1 fig., 1958.

In tests at the Forest Products Research Laboratory, Princes Risborough, to determine the limitations of the benzidine staining test for distinguishing between pine heartwood (bright red) and sapwood (yellow-yellowish brown: Koch & Krieg. *Chemikerztg.* **62**, 15, pp. 140–141, 1938), blocks of *Pinus sylvestris* (5×2·5×2·5 cm.), in which the boundary between the closely similar heart- and sapwood had been previously marked with a pencil, were exposed to flask cultures of 2 brown rot fungi (*Lentinus lepideus* and *Coniophora cerebella* [*C. puteana*]) and 2 white rot fungi (*Fomes annosus* and *Polystictus versicolor*) on 5% malt agar at 22° C. for 3 or 6 months.

It was found best to apply the test immediately after removal of the blocks from the flasks. At 3 months the colour difference was quite clear in all cases, though it was becoming obscure in blocks exposed to *L. lepideus*. After 6 months both heartwood and sapwood exposed to *L. lepideus* gave a brown colour. With *P. versicolor* the distinction was clear, though the sapwood was a brighter yellow than in controls. With *C. puteana* the results were obscure, as they were for the most part with *Fomes*, though with the latter it was usually possible to make out a distinction when the block was scraped. It is emphasized that the test was severe, and that it was only heartwood in an advanced stage of decay which failed to give the characteristic reaction. Sapwood treated with certain preservatives, notably creosote, gives a colour similar to the heartwood in the benzidine test.

Lance (O. C.). **History and development of wood preservation for millwork.**—*For. Prod. J.*, **8**, 10, pp. 61–A–64–A, 8 fig., 1958.

This paper, presented at the 12th National Meeting of the Forest Products Research Society, Madison, June 1958, gives an account of the achievements of a number

of industrial and research groups in the United States interested in wood utilization, organized into a working unit for the purpose of seeking scientific solutions to various problems of mutual concern relating to millwork, and instituting standards for preservatives, both water-repellent and toxic.

RENNERFELT (E.). **Träskyddskommiténs fält- och rötkammarförsök med olika träimpregneringsmedel. Redogörelse nr IV.** [The Wood Preservation Committee's field and rot-chamber experiments with different timber preservatives. Report No. IV.]—*Medd. SkogsforsknInst.*, **48**, 6, 7 pp., 1 fig., 14 graphs, 1958. [English translation.]

Creosote has afforded the most effective protection against decay in pine sapwood stakes and posts in the experiments which have been in progress for 14 yr. [**35**, p. 136], while Boliden salts, especially K33, were superior to the fluorine-containing basilit UA and Boliden fluorsalt. The results of double-treatment trials (using pressure impregnation in 1 case) with Boliden salt BIS alone, followed in a 2nd series by immersion in various oils, showed that the combination was more efficient. Creosote and Höganäs oil conferred a similar measure of protection in a comparative test.

SANDERMANN (W.), CASTEN (R.), KRASTING (W.), & PIEPER (J.). **Studien auf dem Gebiete der Holzschutzchemie.** [Studies in the field of wood protection chemistry.]—*Holzforschung*, **10**, 4, pp. 57–66, 3 fig., 3 diag., 7 graphs, 1958.

A box made of pinewood, painted with a chloronaphthalene preparation at the usual strength (100 g./sq. m.), given 2 coats of varnish ('Alak-Aussen' 1 and 3 days after treatment), and left out of doors, was shown by chemical analysis of wood samples to have lost all the preservative by evaporation within 3 months. In subsequent tests with a 'rapid weathering' apparatus, in which samples were exposed to ultra-violet and infra-red rays and to a water spray, both pentachlorophenol and chloronaphthalene were lost by evaporation: varnishing appeared to reduce evaporation slightly and to fix the preservative in some small degree. In evaporation tests at 60° C. chloronaphthalene was especially volatile. The least volatile of the blue stain preservatives were salicylanilide and phenyl mercury acetate.

KENNEDY (R. W.). **Strength retention in wood decayed to small weight losses.**—*For. Prod. J.*, **8**, 10, pp. 308–314, 1 fig., 3 graphs, 1958.

At Yale University School of Forestry, New Haven, Connecticut, the relation between strength retention of 12 timbers (ranging from very durable to non-durable) and wt. loss on malt agar [cf. **34**, p. 621] caused by *Poria monticola* and *Polyporus* [*Polystictus*] *versicolor* was examined. In most specimens strength [cf. **38**, p. 106], as determined by static bending in a Baldwin hydraulic machine, was severely reduced at a wt. loss of only 1%. Decay by *P. monticola* generally induced higher strength losses than that caused by *P. versicolor*. No significant differences in % strength retention were detected among the spp. attacked by *P. versicolor* when compared at equivalent wt. losses; but a marked diversity was noted among woods when they were similarly decomposed by *P. monticola*. This variation was attributed to different degrees of cellulose hydrolysis. Thus, the wt. loss criterion appears to be very insensitive and the strength retention evaluation fails with brown rot fungi. As a substitute for a strength test, it is suggested that percentage increase in alkali solubility could be used to demonstrate the degree to which wood attacked by brown-rotters such as *P. monticola* has deteriorated.

HUBER (H. A.). **Preservation of particleboard and hardboard with pentachlorophenol.**—*For. Prod. J.*, **8**, 12, pp. 357–360, 4 fig., 1958.

Hitherto, particleboard has been principally used as a core stock in furniture faced with wood veneer or plastic laminates. In the future it is expected that it will

also be used as a base for tile or wood flooring of houses built on a slab. The addition of preservatives to particleboard would allow its entry into new and expanded markets. For this study at the Dow Chemical Co., Michigan, pentachlorophenol [**37**, p. 607] and sodium pentachlorophenate were used. It was concluded from preliminary tests that if the chips were to be sprayed directly, and the bond strength was to remain the same, the preservative should be added before drying the wood particles. The direct addition of sodium pentachlorophenate to the resin with a slight excess of water would be a satisfactory procedure, but to establish this trials in a commercial plant were necessary. Several runs were successfully completed to produce board containing various combinations of sodium pentachlorophenate with urea-formaldehyde resin and 1 combination of the former with phenol-formaldehyde resin. Samples of the finished board were subjected to the soil-block test, modified by decreasing the incubation time and excluding the weathering cycle. The preservative was added on the basis of dry wood wt.

Analysis showed uniform distribution of the preservative throughout the different areas of the finished board, with little if any loss during the hot-press operation. The range of wt. loss on control specimens conditioned to equilibrium moisture content before and after exposure for 6 weeks to *Lenzites trabea* [loc. cit.] (Madison 617) was 14–20%. If weight losses were the only criterion of decay, the addition of as little as 0·3% dry wood wt. of sodium pentachlorophenate would be sufficient to prevent decay under the test conditions. However, aerial growth was noted on the samples containing 0·3%, though not with 0·65%.

Soil-block tests on hardboard gave a threshold of 0·4–0·6% technical grade sodium pentachlorophenate. With 0·6% the cost of preserving ½ in. board would be approx. $3.00/1,000 sq. ft.

There appears to be little if any difference in the modulus of rupture caused by the addition of sodium pentachlorophenate.

Palti (J.). **Oidiopsis diseases of vegetable and legume crops in Israel.**—*Plant Dis. Reptr*, **43**, 2, pp. 221–226, 4 fig., 1959.

The symptoms, distribution, and control measures (sulphur dusts and sprays) are described for the diseases caused by *Oidiopsis* (*Leveillula*) *taurica* [**37**, p. 521] in Israel on tomato, eggplant, chilli [*Capsicum*], potato [cf. **26**, p. 532], carrot, onion (apparently a new host record), lucerne, and fenugreek (*Trigonella foenum-graecum*). The symptoms (yellow spots on the upper leaf surface and whitish down on the lower) are not found on young plants, and progress from older to younger leaves. Appreciable losses are caused on tomato, eggplant, and chilli only. These diseases differ widely in their seasonal and regional distribution in Israel.

Starygina (Mme L. P.) & Shishelova (Mme N. A.). Мягкая гниль овощных культур и меры борьбы с ней. [Soft rot of vegetables and measures for control.]—Бюл. науч.-тех. информ. с.-х. Микробиол. [*Bull. nauch.-tekh. inform. sel.-khoz. Microbiol.*], *1957*, 3, pp. 24–26, 1957. [Abs. in *Referat. Zh. Biol., 1959*, 2, p. 205, 1959.]

In a study of soft rot (*Erwinia carotovora*) of different vegetables in the Moscow region, it was found that *Pseudomonas fluorescens*, *Bacterium polymyxa*, *B. mesentericus*, *B. pumilus*, and others could also cause soft rot. They were present in the tissues of apparently healthy plants. Inoculations were successful only at 30–35° [C.] and high humidity with a large quantity of inoculum.

Kristensen (H. R.) & Christensen (M.). **Virusgulsot hos Boderoer. I.** [Virus yellows of Beets. I.]—*Tidsskr. Planteavl*, **62**, 3, pp. 369–419, 4 fig., 1 graph, 1958. [English summary. 49 ref.]

This is a comprehensive, up-to-date survey of the work in Denmark, mostly at the State Agricultural Research and Experiment Stations, on the host range, methods

of diagnosis (with special reference to serological procedures), effect on yield, and control by aphidicidal sprays of beet yellows virus [**37**, p. 690]. Using virus from *Tetragonia expansa* the author has prepared an antiserum with a titre of 1:2,560, which seldom reacts with sap of healthy beets at dilutions of more than 1:40. Plants inoculated in mid-June yield 27% less dry matter (leaves and roots), but those inoculated in mid-Aug. lost very little.

The author concludes that where yellows is serious spraying of beet would always be profitable provided the 1st application was given as *Myzus persicae* was detected in the fields.

Burghardt (H.) & Bercks (R.). **Untersuchungen an verschiedenen Varianten des Vergilbungsvirus der Beta-Rüben.** [Studies on different variants of Beet yellows virus.]—*Phytopath. Z.*, **34**, 3, pp. 325–337, 8 fig., 2 graphs, 1959. [English summary.]

At the Institut für Virusserologie, Brunswick, Germany, 8 isolates of beet yellows virus from different localities were tested for infectivity, symptom development, serological reaction, and relationship. A comparison was also made between the etch variant and the yellow net virus [**37**, p. 747]. It was concluded that the yellows virus isolates were more closely related to one another than perhaps might be supposed from the symptoms produced, although certain less evident differences may have been overlooked in some.

In spite of certain symptomological similarities, the etch variant appears not to be related to yellow net virus, which so far clearly does not occur on the European mainland.

Troutman (J. L.) & Fenne (S. B.). **The occurrence of curly-top in Virginia.**—*Plant Dis. Reptr*, **43**, 2, pp. 155–156, 1 fig., 1959.

Isolated cases of suspected sugar beet curly top virus on tobacco [cf. **35**, p. 552; map 24], diagnosed on the appearance of the symptoms alone, have been observed in several areas in Virginia, and 1 case on tomato.

Sylvester (E. S.). **Latent period phenomena in transmission of Sugar Beet yellow-net virus by green Peach aphids.**—*J. econ. Ent.*, **51**, 6, pp. 812–818, 4 graphs, 1958.

The author's previous conclusion as to the absence of a latent period in the transmission of sugar beet yellow-net virus by *Myzus persicae* [**28**, p. 433] has been re-examined at the Dept of Entomology, University of California, Berkeley, and modified as follows. Virus was acquired by 1·1% of the aphids in cages left in contact with a virus source leaf for 1 hr. Max. acquisition, represented by infectivity of some 25% of the population, occurred when the cage was left *in situ* for 48 hr. When cages each containing 2 aphids that had been reared on virus source plants were placed for 1 hr. on healthy test plants, approx. 4% contracted infection. An increase in the test feeding access time raised the probability of transmission up to a max. of about 25% with periods of 24 or 48 hr. duration. Analysis of the results of serial transmission experiments with single aphids demonstrated a variable acquisition access period, and observations on subsequent sequential 24-hr. test feeding access periods point to the existence of a measurable latent period of 3½ days. In this analysis the latent period was defined as the average time in excess of the acquisition threshold period required by the aphids to begin virus transmission.

Drachovska (Mme M.). **Nová virová choroba Cukrovky poblíž našich hranic.** [New virus diseases of Sugar Beet near our frontier.]—*Za vysokou úrodu*, **6**, 8, p. 184, 1958. [Abs. in *Referat. Zh. Biol., 1959*, 4, p. 203, 1959.]

In Polish districts near the frontier of Czechoslovakia a new sugar beet virus

disease causing leaf curl [cf. **36**, p. 157; **37**, p. 566] and decreasing the yield by 45–75% was noticed. It is transmitted by *Piesma quadratum*, which retains the virus all through the winter. The disease is especially severe in the spring when the insects feed intensively on the young plants. The planting of bait plants on the borders of sugar beet fields proved effective.

Kozÿrenko (A. Kh.). Эффективность протравливания Свекловичных семян в борьбе с корнеедом. [Effectiveness of treatments of Beet seeds for the control of black leg.]—Бюл. науч.-тех. информ. Льгов. опыт.-селек. Ст. [*Bull. nauch.-tekh. inform. L'gov opit.-selec. Sta.*], *1958*, 1, pp. 57–60, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 2, p. 205, 1959.]

In the last 5 yr. in Kursk region, U.S.S.R., tests with different compounds against beet black leg [*Phoma betae*], which is very severe (60–70% loss) in the region, caused by the structureless and water-logged soil and the early cold weather, showed that granosan (400 g./l centner) applied to seed 2–3 days before sowing decreased the incidence by half. Treatment 2–3 months before sowing gave sturdier and more resistant plants and the effectiveness of the compound was not decreased.

Kerling (L[uise] C. P.). **De microflora op het blad van Beta vulgaris.** [The microflora on the leaf of *B. vulgaris*.]—*Tijdschr. PlZiekt.*, **64**, pp. 402–410, 2 graphs, 1958. [English summary.]

The microflora of leaves of the beet var. Jaapjes Groenkraag was followed at intervals during May–Oct. by washing leaves or pieces thereof in known volumes of water and plating out, and in Nov. the microfloras of a green, a yellowing, and a wilted leaf of the var. Kleinwanzleben were likewise compared. Of the 34 fungal spp. identified most were either soil inhabitants or known to be ubiquitous. *Phoma betae* was the only parasite, and inoculations with a spore suspension of this sp. were found to give rise to small necrotic specks on the leaves. *Sporobolomyces roseus* [cf. **35**, p. 291] was frequent. With regard to the term 'phyllosphere' [loc. cit.] it is observed that fungi on the leaf surface ought properly to be compared with those on the root surface rather than with those in the rhizosphere.

Schrader (Roswitha). **Untersuchungen zur Biologie der Erbsenmycorrhiza.** [Studies on the biology of Pea mycorrhiza.]—*Arch. Mikrobiol.*, **32**, 1, pp. 81–114, 22 fig., 1 graph, 1958.

At the Botanische Abteilung Madaus, Cologne-Merheim, Germany, to determine the fungal partner of pea mycorrhiza and to elucidate its vegetative development in Kelvedon Wonder [cf. **37**, p. 616] infection was effected by the addition to the mycorrhiza-free medium of old infected roots or by smearing young uninfected roots with pulverized infected root tissue and sand.

The swollen hyphal 'inner' vesicles which persist in the soil or old root cortex give rise to hyphae with terminal 'outer' vesicles, which infect the root hairs and epidermal cells. In the inner root cortex, arbuscules and sporangioles develop, while in the outer parenchyma intercellular 'inner' vesicles are produced. The fungus appears to be a phycomycete [cf. **3**, p. 539].

A prerequisite for heavy infection and the corresponding copious formation of inner and outer vesicles is strong shoot and root growth. The influence of sunlight on mycorrhizal development is probably reflected through the carbohydrate economy of the host.

Orozco-Sarria (S. H.) & Cardona-Alvarez (C.). **Evidence of seed transmission of angular leaf spot of Bean.**—*Phytopathology*, **49**, 3, p. 159, 1959.

At the Estación Experimental Agropecuria 'Tulio Ospina', Medellin, Colombia,

Isariopsis griseola was shown to be seed-borne in the bean (*Phaseolus vulgaris*) line 143 but not in other lines or vars. investigated [**36**, p. 369]. The fungus grew out when surface sterilized seed with a red-brown discoloration of the coat was placed on agar or moist filter paper at 24° C., and must therefore be borne in or under the seed coat or the hilum. Survival in stored seed declined to 10% at 9 months and nil at 12. Primary infection occurred on the cotyledons of seedlings from surface-sterilized, discoloured seed.

Panzer (J. D.) & Nickeson (R. L.). **Delayed synergism of bacterial blight and Bean mosaic on Phaseolus vulgaris L.**—*Plant Dis. Reptr*, **43**, 2, pp. 133–136, 1959.

At S. Dakota State College, Brookings, 12 commercial vars. and 36 foreign accessions of bean [*Phaseolus vulgaris*] were field inoculated with *Xanthomonas phaseoli* and common bean mosaic virus, separately and in combination. Disease readings were taken 4 times during the season. A synergistic effect of the 2 pathogens was apparent in the foliage symptoms; but was not reflected in yield, as it occurred late in the season. Resistance of a var. to 1 pathogen was markedly altered in most cases when the 2nd pathogen was also present; 39 of the vars. and accessions were resistant to 1 disease but only 5 to both diseases together.

Baggett (J. R.) & Frazier (W. A.). **Disease resistance in the Runner Bean, Phaseolus coccineus L.**—*Plant Dis. Reptr*, **43**, 2, pp. 137–143, 2 fig., 1959.

At the Oregon State College, Corvallis, 6 vars. of runner beans which were tested for disease resistance with a view to crossing with *P. vulgaris* were only affected by 2 strains of lucerne mosaic virus of 27 virus inocula which also included strains of bean yellow mosaic virus, bean common mosaic virus, western ringspot virus (a newly discovered virus on bean, not yet classified), and unidentified forms carried in gladioli. Other tests on a smaller scale also indicated degrees of resistance of these vars. to halo blight (*Pseudomonas* [*medicaginis* f.sp.] *phaseolicola*) [**36**, p. 369], bean rust (*Uromyces phaseoli* var. *typica* [*U. appendiculatus*]), and *Fusarium solani* f. *phaseoli*.

Milatović (Ivanka). **Pokusi suzbijanja gljive Isariopsis griseola na Grahu.** [Control experiments against *I. griseola* on Beans.] *-Zasht. Bilja (Plant Prot., Beograd), 1958*, 45, pp. 39–42, 1958. [English summary.]

At the Faculty of Agriculture and Forestry, Zagreb, conidia of *I. griseola* failed to germinate on 1% Bordeaux, 1% lime-sulphur, 0·5% sulikol, 0·5% kumulus, or 0·75% thiovit, indicating the possible value of one of these against the disease on beans [*Phaseolus vulgaris*: cf. **38**, p. 49]. Spraying is necessary in early spring. Seed dusting with ceretan [**35**, p. 173], germisan, agrosan, and copper carbonate at 0·1–0·2% is effective, although the last reduced germination in laboratory tests.

Wester (R. E.) & Jorgensen (H.). **A new race of Phytophthora phaseoli from Lima Beans.**—*Plant Dis. Reptr*, **43**, 2, pp. 184–186, 3 fig., 1959.

It is reported from the U.S. Dept Agric. that in greenhouse tests at Beltsville, Maryland, seedlings of Thaxter and U.S. 355 Lima beans [*Phaseolus lunatus*] were found to be susceptible to race B of *Phytophthora phaseoli* [**31**, p. 366; **37**, p. 619], a new race isolated from pods of the latter var. in New Jersey. Other vars. of Lima bean resistant to race A, including U.S. 155 and 3 Fordhook types, were also susceptible to race B.

Skiles (R. L.) & Cardona-Alvarez (C.). **Mancha gris, a new leaf disease of Bean in Colombia.**—*Phytopathology*, **49**, 3, pp. 133–135, 3 fig., 1959.

From the Estacion Experimental Agropecuria 'Tulio Ospina', Medellin, it is

reported that a leaf disease of field bean (*Phaseolus vulgaris*), 1st noted in Colombia in 1953, and mistaken for incipient infection by *Isariopsis griseola* [see above], is in fact caused by *Cercospora vanderysti*. The grey mat of conidiophores that covers the under surface of the lesions distinguishes the disease in the field from those caused by *I. griseola* or *C. canescens*. The pathogen is widely distributed at 1,500–2,200 m. and is potentially serious; certain introduced bean vars. show resistance, considerable in some cases.

Sitterly (W. R.) & Epps (W. M.). **Lima Bean scab found in South Carolina.**—*Plant Dis. Reptr*, **42**, 12, p. 1309, 1 fig., 1958.

At the S. Carolina Truck Crop Experimental Station, Charleston, Lima bean [*Phaseolus lunatus*] scab caused by *Elsinoe phaseoli* [map 194] was found for the 1st time in the U.S.A. It is believed that the pathogen was probably brought in with the seed of Concentrated Fordhook, as the incidence in this var. was much greater than in the others.

Anderson (C. W.). **Vigna and Crotalaria viruses in Florida. V. Comparative transmission tests with aphids and beetles.**—*Phytopathology*, **49**, 2, pp. 117–118, 1959.

In further studies at Florida Agricultural Experiment Station, Gainesville [cf. **35**, p. 263], Black-eye cowpea mosaic virus [str. of cowpea mosaic virus] and the cowpea str. of cucumber mosaic virus were successfully transmitted by *Myzus persicae* [**37**, p. 699] but not by bean leaf beetles (*Ceratoma trifurcata*), which also failed to transmit virus 2B (a strain of bean yellow mosaic virus from lupin [**36**, p. 809]). This failure further indicates that the writer's strains of cowpea mosaic virus and cucumber mosaic virus differ from the cowpea mosaic viruses of Dale [**33**, p. 201] and Smith [**4**, p. 203].

Dubey (H. D.). **Relation of soil texture and occurrence of root rot disease (Sclerotium rolfsii Sacc.) of Peanut.**—*Plant Dis. Reptr*, **42**, 12, pp. 1376–1377, 1958.

Investigations at the Deochanda Experiment Station, Bihar, India, showed that the highest incidence of root rot of groundnuts caused by *S. rolfsii* [cf. **36**, p. 633] occurred in soils with high sand and low clay content, the aeration of such soils favouring the pathogen. There was a negative correlation between N content of the soil and disease incidence, and a positive one between the latter and the P content. There was no apparent relation between the K and calcium carbonate content, or the pH, and disease incidence.

Marlatt (R. B.) & McKittrick (R. T.). **Pink-root resistant Onions for Arizona.**—*Plant Dis. Reptr*, **42**, 12, pp. 1310–1311, 1958.

At the Arizona Agricultural Experiment Station, Mesa, 8 early onion vars. were grown for 4 yr. in irrigated desert soil infested with *Pyrenochaeta terrestris* [cf. **35**, p. 743]. Granex yielded better than Texas Hybrid 28, Excel, L365, and Eclipse despite its susceptibility to pink root. In storage Eclipse proved the poorest; Granex stored better than the other vars. at 75–85° F., showing the least amount of decay.

Treggi (G.). **Qualche ricerca su ceppi di Pleospora herbarum (Pers.) Rabh. isolata da Cipolla e da Aglio.** [Researches on strains of *P. herbarum* isolated from Onion and Garlic.]—Reprinted from *Ann. Fac. Agr. Pisa*, N.S. **18**, 8 pp., 4 graphs, 1958.

The results are presented of a study of *P. herbarum* [cf. **36**, p. 112], isolated from onion and garlic crops in the Province of Massa, Italy, in which the fungus caused 20–50% losses. In most cases *Pseudomonas fluorescens* was also present. It was

found that the opt. temp. for the growth of *P. herbarum* was 20–25° C. The fungus grew well at pH 4–6 (opt. 5); it was highly sensitive *in vitro* to orthocide 83 and dithane Z 78; with the former, no growth occurred at 0·01%, nor with the latter at 0·06%. There were varietal differences in susceptibility and a synergistic effect with the fungus and the bacterium together.

Janýška (Mme A.). **Příčiny neúspěchu v pěstování Česneku.** [The reasons for failure in Garlic growing.]—*Ovocn. Zelin*, **5**, 10, pp. 312–314, 1957. [Abs. in *Referat. Zh. Biol., 1959*, 5, pp. 204–205, 1959.]

The cause of heavy losses in Czechoslovakian garlic fields was infection by *Ditylenchus dipsaci*, *Rhizoglyphus echinopus*, and *Fusarium allii-sativi*. Rotation of crops, planting healthy setts, and soaking the planting material in 4% polybaryta are recommended. Soaking decreased infection from 26·2–4·4% and increased yield from 49·9–162·6 centner/ha.

Knoblauch (F.). **Tørringsforsøg med Skalotteløg.** [Drying experiments with Shallots.]—*Tidsskr. Planteavl*, **62**, 4, pp. 677–692, 1 graph, 1958. [English summary.]

In trials during 1951–57 at the State Experiment Stations of Hornum and Spangsbjerg, Denmark, artificially cured shallots sustained much less damage from infection by *Botrytis allii* than field-cured [cf. **35**, p. 264]. Thus, after storage from Oct. to Apr. at 5–10° C. the percentages of sound stocks treated by the 2 methods were 77 and 39, respectively. A delay of 1–2 weeks after lifting did not impair the efficacy of artificial curing provided the bulbs were well ripened, with strong outer scales. Postponement for 4 weeks, however, resulted in a 20% reduction of efficiency, while in seasons adverse to growth the incidence of neck rot might be doubled after a delay of 1 week and half the benefit of the treatment lost when a month elapsed before curing was started. For complete drying of freshly lifted shallots 4–6 days at 40° was essential, but 2–3 days sufficed when the treatment was delayed for a fortnight. In experiments during 1954–5 and 1955–6 a sulfo and a plastic spreader were added to a 0·4% zineb spray which was applied just before lifting. The former was found to accelerate and the latter to retard the curing period.

The artificially cured shallots kept well and did not require cold storage; a temp. of —2–0° was the most suitable for the field-cured. At 15–20° the loss of weight for both curing methods was double that in the air-cooled store at 5–10°. In a test in which bulbs stored at —2° were transferred during Jan.–Feb. to an air-cooled room until 1 Apr. the losses were heavier than among those maintained at the constantly higher temp.

Peronospora destructor was also effectively combated by curing for 36 hr. at 40°.

Grogan (R. G.) & Kimble (K. A.). **The association of Fusarium wilt with the Asparagus decline and replant problem in California.**—*Phytopathology*, **49**, 3, pp. 122–125, 1 fig., 1959.

At the University of California, Davis, a decline in productivity of asparagus plantings, which limits their profitable life to 10–15 yr. and is accompanied by attenuation and reddish discoloration of the root system and similar discoloration of the vascular tissue in the stems, was shown by isolations from diseased plants and from seedlings grown in affected soil to be associated with the presence of a number of pathogens, of which *F. oxysporum* f. *asparagi* [**21**, p. 236; cf. **35**, p. 265] was the most prevalent and, on inoculation, the most virulent. The fungus spreads very slowly in the soil, but is seed-borne; it was present to a depth of 5 ft., max. conc. at 2 ft. Steam sterilization of the soil or treatment with CBP55 or chloropicrin considerably reduced but did not eliminate the disease. The breeding of resistant vars. has been initiated.

Costa (A. S.), Duffus (J. E.), Morton (D.), Yarwood (C. E.), & Bardin (R.). **A latent virus of California Artichokes.**—*Phytopathology*, **49**, 1, pp. 49–53, 1959.

A latent virus (*Marmor cynarae*) widespread on all types of globe artichoke grown in California can infect various spp. of Compositae, Chenopodiaceae, Solanaceae, and other families. It caused mottling on inoculation to *Nicotiana clevelandii* and *Lactuca scariola*, used to identify it, and *Chenopodium amaranticolor* proved a good local lesion host. In preparations from artichoke leaves the virus soon became inactivated unless sodium sulphite was added at extraction; in those from zinnia or *N. clevelandii* it was more stable. The virus is inactivated *in vitro* at room temp. in 96 hr., withstands dilution of 5^{-5} (though activity is greatly reduced by 5^{-3}), and 10 min. at 65° C., but not at 70°. It is easily transmitted mechanically and *Myzus persicae* is a vector, though vegetative propagation accounts chiefly for its spread. Its behaviour and properties distinguish artichoke latent virus from dodder latent virus [**23**, p. 247] and sugar beet latent virus [**31**, p. 157].

O'Brien (Muriel J.) & Webb (R. E.). **Preservation of conidia of Albugo occidentalis and Peronospora effusa, obligate parasites of Spinach.**—*Plant Dis. Reptr*, **42**, 12, pp. 1312–1315, 2 fig., 1958.

At Beltsville, Maryland, spinach leaves with abundant white blisters (*A. occidentalis*) [**32**, p. 504] and blue mould (*P. effusa*) [**37**, p. 751] conidia were collected from greenhouse inoculated plants, placed immediately at —10° F., and stored for 5 or 6 months. Germination counts were made at monthly intervals. Although germination percentage after 5 or 6 months was very low, an infection of healthy plants was obtained under greenhouse conditions with conidial suspensions of the 2 fungi.

Tucker (H.) & Foster (R. E.). **Statistical technique in indexing Lettuce seed for mosaic content.**—*Plant Dis. Reptr*, **42**, 12, pp. 1339–1341, 1959.

A table is presented from the Arizona Agricultural Experiment Station, Mesa, from which may be obtained the confidence levels applicable to the evaluation of seed-borne infection of lettuce mosaic virus [**36**, p. 371] at 0·1% or less in accordance with the size of the sample taken. Its use is explained.

Whitaker (T. W.), Bohn (G. W.), Welch (J. E.), & Grogan (R. G.). **History and development of head Lettuce resistant to downy mildew.**—*Proc. Amer. Soc. hort. Sci.*, **72**, pp. 410–416, 3 fig., 1958.

In breeding work at the U.S. Dept Agric., La Jolla, California, and at the University of California, Davis, several lines of head lettuce resistant to *Bremia lactucae* [cf. **20**, p. 242, *et passim*] were developed, resistance originating from a single source, *Lactuca serriola* (P.I. 104854), from Russia. All these lines, 46431, 46451, 46452, 46453, 46454, 46455 (classified as Imperial 44 type), 46429, 46430 (K^3 type), 46140, 46255, 46418, 46419, 46450 (Imperial D type), and 46424, 46425, 46426, 46427, and 46428, when tested in the greenhouse, proved to be homozygous for resistance to a composite sample of the fungus collected in the central coastal districts of California. Lines 46424, 46425, 46426, 46428, 46429, 46430, and 46450 were grown in the field at Weslaco, Texas, during the winter of 1956–57, and all were resistant.

Ceponis (M. J.) & Friedman (B. A.). **Pectolytic enzymes of Pseudomonas marginalis and their effects on Lettuce.**—*Phytopathology*, **49**, 3, pp. 141–144, 1 fig., 2 graphs, 1959. [24 ref.]

This more detailed account of studies by the Market Pathology Lab., U.S. Dept Agric., New York [**37**, p. 622], notes that strong protopectinase and pectin depolymerase activity were found in filtrates with pH optima around 7·5–8·5, activity of

the enzymes being markedly reduced by heating for 20 min. above 50° C. Pectinmethylesterase activity was weak, and a polygalacturonase forming monogalacturonic acid could not be demonstrated chromatographically. The results are discussed with reference to those obtained by other workers [cf. **37**, p. 392].

Van Hoof (H. A.). **Bobbelblad bij Sla.** [Big vein in Lettuce.]—*Tijdschr. PlZiekt.*, **65**, 1, pp. 24–26, 1 pl., 1959. [English summary.]

Big vein disease of lettuce was widespread in the Netherlands in 1958, and similar symptoms were seen on endive. *Olpidium* sporangia were found in the roots of both hosts [cf. **37**, p. 621]. The disease was transmitted to healthy lettuce growing in infested soil in the greenhouse.

Schnathorst (W. C.). **Growth of Erysiphe cichoracearum on isolated lower epidermis and spongy mesophyll of Lettuce.**—*Phytopathology*, **49**, 2, pp. 115–116, 1 fig., 1959.

At the University of California, Davis, *E. cichoracearum* [**38**, p. 175] was cultured on strips of lower epidermis from frost injured leaves of Great Lakes lettuce, folded double, floated on 3% glucose or distilled water, illuminated with fluorescent light, and dusted with conidia; the fungus was also grown on the exposed mesophyll tissue of leaf pieces propped against the sides of a small beaker containing a little water.

Murakishi (H. H.) & Potter (H. S.). **Fungicidal control of Botrytis leaf rot of hothouse Rhubarb.**—*Plant Dis. Reptr*, **42**, 12, pp. 1316–1318, 1 fig., 1958.

In 2 yr. of spray trials at Michigan State University, East Lansing, for the control of leaf rot (*B. cinerea*) [**37**, p. 199] it was found that losses were reduced by a number of fungicides, including captan and phaltan 50-W (both at 2 lb./100 gal.) when applied on a weekly schedule (disease ratings in 1 trial 0·83 and 0·64, respectively, compared with 3·9 in the control). Only captan, however, was approved on rhubarb by the Food and Drug Administration.

Anderson (C. W.). **A study of field sources and spread of five viruses of Peppers in central Florida.**—*Phytopathology*, **49**, 2, pp. 97–101, 1959.

At the Florida Agricultural Experiment Station, Gainesville, 540 plants of 150 spp. growing in or near *Capsicum* fields were sampled as possible hosts of the viruses of tobacco mosaic, tobacco etch, potato Y, cucumber mosaic, and aster [tobacco] ring spot [**36**, p. 677]; 79, of some 21 spp., yielded isolates of 1 or other of these on inoculation of a set of indicators. Certain spp. of *Solanum* and *Physalis* appeared to be important sources of tobacco etch and potato Y viruses [cf. **37**, p. 693]; *Linaria canadensis* may also often harbour etch, and in 1 county *Lespedeza striata* was a suspected source. Some *Physalis* spp. and *Plantago virginica* proved the chief sources of the ring spot virus. Cucumber mosaic virus was obtained from 13 spp., including *Melothria pendula*, *Salvia lyrata*, and *Scoparia dulcis*, newly recorded sources for Florida; *Commelina nudiflora* [**10**, p. 429], some perennial ornamentals, and cowpea are the main sources in the area. Although tobacco mosaic virus was obtained from several spp. of *Solanum* and *Physalis*, there was no evidence that it spread from these to the peppers.

Arx (J. A. von). **Über den Ascomyceten Rhagadolobium cucurbitarum (Rehm) Theiss. et Syd.** [On the ascomycete *R. cucurbitarum*.]—*Fungus, Wageningen*, **28**, 1–4, pp. 4–6, 2 fig., 1958.

Following a study of herbarium specimens of this pathogen of cucurbits [cf. **26**, p. 335], the author proposes a new genus, *Asterotexis*, with *A. cucurbitarum* (syn. *Dothidella cucurbitarum*, *R. cucurbitarum*) as its type.

Sowell (G.). **Cucumber fungicide testing on the west coast of Florida.**—*Plant Dis. Reptr*, **42**, 12, pp. 1333–1336, 1958.

Fungicide tests at the Gulf Coast Experiment Station, Bradenton, Florida, on Marketer cucumber [cf. **36**, p. 632], applying 50–200 gal./acre at 300–400 lb./sq. in. according to age showed nabam+$ZnSO_4$ to be very effective against downy mildew (*Pseudoperonospora cubensis*) [**37**, p. 64] and to result in the highest yield. Zineb gave equal control but reduced the yield during 1 season, as did maneb and nabam +$MnSO_4$. Thiram gave excellent control of soil rot (*Rhizoctonia* [*Corticium*] *solani*) [**36**, p. 807], anthracnose (*Colletotrichum lagenarium*) [**37**, p. 751], and cottony leak (*Pythium aphanidermatum*) [**37**, p. 702], and ferbam some control of soil rot. Captan, maneb, and nabam+$MnSO_4$ gave excellent control of anthracnose. Ferbam, captan, and zineb+neutral Cu partially controlled cottony leak.

Walker (J. C.). **Two new pickling Cucumber varieties resistant to scab and mosaic.** —*Plant Dis. Reptr*, **42**, 12, pp. 1337–1338, 1958.

At Wisconsin Experiment Station, Madison, as a result of crossing and back crossing the stock from which the original Wisconsin SMR 9 and SMR 12 [**35**, p. 73] were derived to Ohio MR 17 and MR 25 and selection from the progeny, 2 new vars. have been selected, Wisconsin SMR 15 from the original cross with Ohio MR 25, and Wisconsin SMR 18 from that with Ohio MR 17. Both vars. proved resistant to cucumber mosaic virus and scab (*Cladosporium cucumerinum*), but the yield capacity of SMR 15 proved slightly lower than that of SMR 12 and about equal to that of Ohio MR 17, both of which were bettered by SMR 18.

Kublanovskaya (Mme G. M.) & Dzhalilova (Mme V. M.). Биологический метод борьбы в фузариозным увяданием Дыни. [Biological method of control of *Fusarium* wilt in Melons.]—*Sad i Ogorod*, **96**, 2, pp. 41–42, 1958.

At the Uzbek Agricultural Academy, the Tashkent Agricultural Institute, and the Uzbek Vegetable and Potato Experimental Station, cotton seed cake and 2 highly active strains of actinomycetes (No. 935–a and No. 1699) [cf. **38**, p. 5] were employed for control of *Fusarium oxysporum* in melon beds.

In pot tests seed germination was stimulated by a mixture of 2% sterile soil preparation of antagonistic actinomycetes combined with non-sterile soil+1% cotton seed cake [cf. **37**, p. 168]. In field plots the mixture was inserted at a depth of 15–20 cm. Fruit formation was strongly promoted and yield raised by 5–31% over the control.

Two applications of cotton seed cake with actinomycete strain No. 935–a (70%, 10 days before sowing and 30% during the period of major growth) was the only treatment to produce a considerable reduction in the incidence of disease (54%). Increased yield where disease was only slightly diminished can be assumed to be connected with the liberation by both actinomycete strains of growth substances as well as antibiotics.

When mushroom is Boletus edulis.—*The Times, Lond.*, 54,455, p. 9, May, 1959.

Summonses under the Food and Drugs Act alleging that mushroom soup which in fact contained no mushrooms had been supplied for sale were dismissed on 7 May by Chichester, Sussex, magistrates who ruled that *B. edulis* used in the soups was properly described as 'mushroom'.

Ochs (G[ertrud]). **Rebenvirus auf Gründüngungspflanzen.** [Vine virus on green manure plants.]—*Mitt. Klosterneuburg*, Ser. A, **8**, pp. 19–21, 3 fig., 1958. [English, French, and Spanish summaries.]

When green manure plants used for fallowing were examined for susceptibility to vine viruses, lucerne, *Lathyrus tingitanus*, broad bean (*Vicia faba* vars. *minor* and

major), and *V. sativa*, were found to act as hosts of the 'Panachüre' isolate [virus 1: **37**, p. 755], whereas *Melilotus alba*, *Brassica napus*, and *Sinapis alba* were resistant to all vine viruses tested.

Ochs (G[ertrud]). **Millionen viruskranke Unterlagsreben verseuchen den Weinbau.** [Viticulture infested by millions of virus-infected rootstocks.]—*Mitt. Klosterneuburg*, Ser. A, **8**, pp. 93–98, 2 fig., 1958. [English, French, and Spanish summaries.]

Following the isolation of several viruses which produce the 'Reisigkrankheit' [vine infectious degeneration] complex [**37**, p. 754], attention is now drawn to the spread of virus diseases in German vine-growing areas by infected rootstocks. Increasing amounts of virus infection were noted in 1955–57 both in rootstocks imported from Italy and France, and in those of home provenance. Expert control of the vineyards from which rootstocks are obtained is recommended as well as the introduction of a suitable virus test.

Storozhenko (E. M.). Новое в борьбе с белой гнилью Винограда. [New control of white rot of Vine.]—Инф. бюл. С.-х. Кубани [*Inform. Bull. Sel.-khoz. Kuban*], *1957*, 2, pp. 21–23, 1957. [Abs. in *Referat. Zh. Biol.*, *1958*, 19, p. 214, 1958.]

When 15% thiram at 4% conc., or 50% at 1%, or dinitrorhodanobenzene+Cu at 4% were used in July on grapes that were as big as peas and again 10 days later, very good control of white rot [*Coniella diplodiella*: **38**, p. 116] was obtained. Vines injured by hail must be sprayed immediately.

Raykov (E.) & Ionev (S.). Инкубационные периоды мильдью. [Mildew incubation periods.]—*Vitic. & Wine-Mak., Moscow, 1958*, 1 (176), pp. 29–36, 1 graph, 1958.

In experiments at the Pleven Institute of Viticulture and Wine-making, Novo-selo, Bulgaria, and in field tests in 1954–5, 8–13° [F.] was the min. range for the development of mildew [*Plasmopara viticola*] on vines. Oily spots, which are characteristic, always appeared with an av. daily temp. of 61°, even with atmospheric humidity below 80%.

On the var. Bolgar 88–99% of the sporangia were formed on the oily spots during the first 3 days, but continued to be produced for 6 days. Spraying should be carried out, therefore, before the end of the incubation period, calculated from the time of infection, i.e. the first night of sporulation. With protracted incubation periods (over 5 days) accompanied by frequent rains, dews, and rapid growth of the vine shoots, spraying should be carried out before the beginning of each incubation period. With shorter incubation periods (4–5 days) it is sufficient to spray for alternate incubation periods before and after flowering, and at the end of each incubation period at the time of flowering. Two sprayings in 1 incubation period are given when it is very protracted, at the time of flowering, and when the Bordeaux mixture has been washed off.

Spraying after mass infection saved 51·4% of leaves and 49% of the bunches.

Verderevskiĭ (D. D.) & Naĭdenova (Mme I. N.). О природе иммунитета Винограда к мильдью. [On the nature of immunity from mildew in the Vine.]—*Vitic. & Wine-Mak., Moscow, 1958*, 8 (183), pp. 24–28, 3 fig., 1958.

Experiments at the Kishinev Agricultural Institute indicated that the phytoncide properties of vines susceptible and resistant to mildew [*Plasmopara viticola*] were significantly different. Zoospores quickly ceased movement in aqueous extracts or diluted cell sap of the mildew resistant hybrid Riparia × Rupestris 101–14, but in sap from European susceptible vars. movement was prolonged. Comparative experiments with phytoncides from different vine vars. on *P. viticola* zoospores and

on the non-pathogenic infusorian *Stylonichia* confirmed the existence of these differences, but the extracts were without effect on *Stylonichia*. In the mildew-resistant hybrid, high conc. of phytoncide was maintained at an even level throughout growth but in the highly susceptible var. Shasla, considerable changes occur: in spring the phytoncide action of the cell sap was very weak; in time it increases, becoming almost as high as in the resistant var. at the end of growth. These results are in accord with observations made on changes in mildew susceptibility in vine leaves.

The authors summarize some of the relevant literature [cf. **8**, p. 483–4; **36**, p. 571].

Kondo (I. N.). О сухорукавности и пятнистом некрозе кустов Винограда. [On dead arm and spotted necrosis in Vine stocks.]—*Vitic. & Wine-Mak., Moscow, 1958*, 2 (177), pp. 22–25, 1958.

Observations carried out from the Central Asiatic Branch of the Magarach Institute support the conclusion that the heavy damage to branches of vine stocks in the vineyards of Uzbekistan, Kazakhstan, and adjacent regions by spotted necrosis is due to frost injury. The best control would be obtained by careful and timely protection in the winter. To prevent soil fungi on stocks covered with earth they should be sprayed with a suitable fungicide. Plants damaged by spotted necrosis [**38**, p. 379] should be stimulated to growth in early spring.

Cook (J. A.) & Mitchell (F. G.). **Screening trials of chelated zinc materials toward the correction of zinc deficiency in vinifera Grapevine.**—*Proc. Amer. Soc. hort. Sci.*, **72**, pp. 149–157, 2 fig., 1958.

At the University of California, Davis, in 1954 and 1955, none of the chelates proved statistically superior to inorganic Zn, either as sprays or soil treatments. The criterion for assessing correction of Zn deficiency was mostly visual improvement, but some tissue analyses for Zn levels in midsummer shoot tips were included. Zn-HEEDTA was the material most likely to be toxic to vines.

Cook (J. A.). **Field trials with foliar sprays of Zn-EDTA to control zinc deficiency in California vineyards.**—*Proc. Amer. Soc. hort. Sci.*, **72**, pp. 158–164, 1958.

In trials at various places in California, significant yield increases resulted from applications to vines affected by Zn deficiency [see above] of 10 foliar sprays of both inorganic and chelated Zn (Zn-EDTA), but the results were erratic. Chelated Zn was not superior to inorganic forms. Vines with obvious deficiency symptoms had under 15 p.p.m. of Zn in the midsummer-shoot tips; of the Zn treatments tested, none gave any measurable Zn increases in the tips.

Seed-borne diseases of tropical and sub-tropical crops. Report of the second working party on seed-borne diseases (Paris, 27–28 July, 1958).—20 pp., Paris, European and Mediterranean Plant Protection Organisation, 1959. [With French version.]

This report of the working party appointed in collaboration with the International Seed Testing Association to prepare instructions on tests by which seed-borne diseases could be detected and which could be adopted internationally, lists, with notes and bibliographical references, 12 organisms, unrecorded or of very restricted distribution in Europe, which cause serious disease. These are divided into 3 groups: A (organisms in respect of which an importing country would be justified in demanding a certificate showing that the seed crop had been inspected in the field or had been grown in a region in which the disease was unknown) comprises *Xanthomonas stewartii* [map 41], *X. oryzae* [map 304], white leaf or hoja blanca virus disease of rice [**37**, p. 658; map 359] (additionally recorded in Costa Rica), not yet proved to be seed-borne, *Diaporthe phaseolorum* [map 360], *Corynebacterium*

insidiosum [map 67], *Glomerella gossypii* [map 317], *Fusarium oxysporum* f. *vasinfectum* [map 362], and *Peronospora tabacina* [map 23]; B (organisms for which testing methods, though available, lack international recognition) comprises *Diplodia macrospora* [map 227] and *Cercospora oryzae* [map 71]; C (organisms on which further work is necessary before a satisfactory testing method can be devised) covers *Peronospora manshurica* [map 268] and *Septoria glycines* [map 361].

Annual Report of the Director of Agriculture, British Guiana, 1957.—53+iii pp., 1957. [Cyclostyled. Received Mar. 1959.]

It is noted in this Report [cf. **35**, p. 750] that sugarcane vars. susceptible to leaf scald [*Xanthomonas albilineans*: **38**, p. 33] occupied less than 3% of the 77,000 acres grown. Incidence was less severe on scattered plantings of B. 34104 than in 1956. Chlorotic streak was widespread.

Blast of rice (*Piricularia oryzae* [**15**, p. 740]) caused serious damage in some of the Essequibo Islands and on the Demerara River. Many coconuts died from bronze leaf wilt [**10**, p. 361] in an abnormally dry year. Brown rot of oranges (*Phytophthora* sp.) caused severe damage in 1 grove on the East Bank, Demerara, and was controlled with perenox. Black arm disease of cotton [*Xanthomonas malvacearum*: map 57] was severe on the trial plots and non-resistant vars. were crippled, though those resistant gave good yields.

Terekhova (Mme N. A.). Влияние процессов регенерации на развитие опухолей вызванных **Bacterium tumefaciens** Томатов. [The effect of the regeneration processes on the tumours caused by *B. tumefaciens* in Tomatoes.]—Физиол. раст. [*Physiol. Rast.*], **4**, 1, pp. 72–76, 1957. [English summary. Abs. in *Referat. Zh. Biol., 1959*, 4, p. 203, 1959.]

At the Microbiological Institute, Academy of Sciences, U.S.S.R., the growth of tumours caused by *B.* [*Agrobacterium*] *tumefaciens* in decapitated tomato cuttings was hindered by the development of roots. It is presumed that the tumours need a great deal of nutriment [cf. **35**, p. 736] for their growth and cannot compete with the increased meristematic growth.

Dutky (S. R.). **Report on white grub control project in Chile.**—*Agricultura téc., Santiago*, **17**, 2, pp. 92–105, 1957. [Received 1959.]

This report covers the results of 3 months' work while the author was acting as a consultant to ICA Mission to Chile on the above project. Most of the work was done at the white grub laboratory of Project 11 of DTICA in Temuco, Province of Cautín.

Examination of larvae of *Hylamorpha elegans* before injection with *Bacillus popiliae* to produce infection sources of milky disease indicated that a very high proportion showed lesions characteristic of *Metarrhizium anisopliae* [cf. **36**, p. 527] infection. This was confirmed by other examinations. Of all living larvae from incubators examined microscopically, fully 75% showed the presence of oidia of the fungus in the haemolymph, and a high proportion dying during incubation developed fructifications. Examination of samples of larvae collected from several areas showed that infection by this fungus was present in most, ranging up to nearly 100%. At Vilcún, the locality from which most of the larvae for use in the present investigation were collected, infection was very high. A careful study to assess the effect of the fungus on populations of *H. elegans* and other spp. of white grubs should be most valuable in predicting outbreaks and disappearance.

A number of antibiotics were tested for their ability to interrupt the fungus disease in the hope that this would permit larvae showing infection to be used for milky disease inoculations. Acromycin and terramycin markedly improved early survival, but also intercepted milky disease development.

A careful plan of study of *M. anisopliae*, an important agent of natural control, should be initiated immediately. Attempts to evaluate the soil density of this fungus by standard plate count methods were not very satisfactory because of the more rapid growth of other fungi.

Domsch (K. H.). **Die Wirkung von Bodenfungiziden. II. Wirkungsdauer.** [The action of soil fungicides. II. Duration of action.]—*Z. PflKrankh.*, **65**, 11, pp. 651–657, 3 graphs, 1958. [English summary.]

Data from further studies [**37**, p. 758] are presented as to the duration of the fungitoxic action of the soil fumigants vapam, mylone, allyl alcohol, and formaldehyde, and the soil fungicides nabam, PCNB, chloranil, and chinosol, in sterile soil at 8° and 20° C., with *Pythium* sp. or *Rhizoctonia* [*Corticium*] *solani* as test fungus. Even at the lower temp. the duration did not in most cases exceed 3 days; for formaldehyde it was 6 days (1 at 20°) and for chinosol 40 (19) at the concentrations employed. The relationship, for captan, between dosage (50–1,000 p.p.m.), duration (0–50 days), and effectiveness, as measured by disease control in soil inoculated with *Pythium* and sown with peas, is illustrated by a 3-dimensional graph: the smaller the quantity of fungicide, the sooner the loss of activity.

At concentrations ensuring control an organic arsenical preparation, captan, and zineb had a half life of 70–75 days, spergon, nabam, and an organic mercurial 15–20 days, and ziram, rhodandinitrobenzol, and thiram 35–45 days.

Grossmann (F.). **Untersuchungen über die innertherapeutische Wirkung organischer Fungizide. II. Chlornitrobenzole.** [Studies on the internal therapeutic effect of organic fungicides. II. Chloronitrobenzenes.]—*Z. PflKrankh.*, **65**, 10, pp. 594–599, 1958. [English summary.]

In further studies at the Institut für Pflanzenpathologie und Pflanzenschutz, University of Göttingen [**37**, p. 449], an acetone solution of pentachloronitrobenzene (PCNB), added to the water supplied to potted tomato plants, was effective against *Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici* when applied before, but not after, infection; this, together with the findings that the effect was weaker in cut shoots, and that the substance showed relatively little activity *in vitro*, was considered evidence that the host metabolism was affected and that the substance is, therefore, not a true systemic fungicide. PCNB (at 50 p.p.m.) was only slightly phytotoxic; 1,3,5-trichlor-2,6-trinitrobenzene gave some control at 50 and 20 p.p.m. but caused considerable plant injury. Although inactive against wilt, 1,3,5-trichloro-2,4,6-trinitrobenzene reduced infection by *Alternaria solani*. All 3 substances showed marked activity against leaf infection by *Phytophthora infestans*. 1-rhodane-2,4-dinitrobenzene proved highly phytotoxic.

Arbuzov (K.), Baĭbekova (Mme Z.), Kudrina (Mme N.), & Chepurov (K.). Синергизм гранозана в смеси с формалином. [Synergism of granosan mixed with formalin.]—Хлопководство [*Cotton-Raising*], **8**, 8, p. 28, 1958.

The synergistic action of granosan-formalin vapour was tested at the Uzbek Agricultural Institute, U.S.S.R., on *Aspergillus niger* and *A. glaucum*, as well as on some [unspecified] organisms pathogenic to domestic animals. Granosan at 1:10,000+0·1% formalin killed all the test fungi in 10 min. For granosan alone 1:1,000 was necessary for the same result.

Rämsch (H.) & Kühne (Charlotte). **Testpilze im Rahmen der Textilprüfung.** [Test fungi within the framework of textile testing.]—*Faserforsch. u. Textiltech.*, **9**, 10, pp. 441–445, 12 fig., 1958. [Russian and English summaries.]

The spp. used to illustrate this account of the 3 methods of evaluating textile disinfectants, viz. growth in pure culture, breaking strength measurement, and

soil burial, employed at the Institut für Technologie der Fasern, Dresden, Germany, are *Trichoderma lignorum* [*T. viride*], *Aspergillus niger*, and *Chaetomium globosum*.

Turner-Graff (Ruhama) & Babad (J.). **The preparation of spore cultures of Penicillium roqueforti for industry.**—*Ktavim* (*Rec. agric. Res. Sta. Rehovot*), **8**, 3–4, pp. 343–350, 1 fig., 1958.

Fresh white bread was refrigerated for 6–24 hr., sliced, dried, ground, and sterilized (6g./60-ml. bottle) before being inoculated with spores of *P. roquefortii* [**38**, p. 129]. The cultures are a uniform blue-green after 6–10 days. For the best results they should be allowed to ripen at 10–12° C. for 2–3 weeks. They are considered completely ripe when the colour has passed from grey to brown-green, and will remain vigorous for over 3 months at summer temp. Details are given for their use in the dairy.

Henniger (H.). **Versuche zur Kultur verschiedener Rassen von Phytophthora infestans (Mont.) de By. auf künstlichen Nährböden.** [Attempts to culture different races of *P. infestans* on artificial media.]—*Phytopath. Z.*, **34**, 3, pp. 285–306, 5 fig., 1 diag., 6 graphs, 1959. [English summary.]

At the Institut für Pflanzenzüchtung Gross-Lüsewitz, Berlin, the growth of 18 different isolates of *P. infestans* [**37**, p. 370], corresponding to 17 well-defined races, varied from one medium to another when tested on 16 different natural media. Rye and maize decoctions, unlike others, gave consistent results in repetitions. Payette & Perrault's (1) and French's (2) solutions [**23**, p. 453; **33**, p. 375] did not give such good growth as a solution (3) made up by the author, containing mineral salts, tartaric, succinic, α-ketoglutaric, and glutamic acids, DL-alanine, L-aspartic acid, L-leucine, α-amino-butyric acid, tryptophane, cysteinhydrochloride, argininehydrochloride, aneurin, and dextrose. *P. infestans* reacts very differently to the various inorganic ingredients of the nutrient. The higher ionic conc. of solution (1) was not the cause of poor growth as the addition of tartaric, succinic, and α-ketoglutaric acid almost invariably reduced mycelial growth; many strains were stimulated by (2) but some were inhibited; in (3) α-ketoglutaric and succinic acids invariably stimulated growth. There was a marked difference in growth in liquid media and the same agarized. Gelatin was more suitable than agar.

Cultures of the different races can be preserved under mineral oil over long periods without any apparent change in racial character or marked reduction in vitality. The fungus is very sensitive to small changes in the composition of the basic solution, so that the effect of a given compound on growth may be reversed by alteration of the other components. Its great physiological variability must be taken into account in all nutritional experiments.

Duquénois (P.) & Schaelderle (Denise). **Revue complémentaire sur les antibiotiques des plantes supérieures.** [A supplementary review of antibiotics from higher plants.]—*Bull. Soc. bot. Fr.*, **105**, 9–10, pp. 526–560, 1958. [246 ref.]

In completion of an earlier paper by P. Duquénois (*Bull. Soc. bot. Fr.*, **102**, pp. 377–405, 1955) later published work is discussed. This contribution contains 6 parts, in addition to the bibliography, dealing, respectively, with general methods of detecting antibiotics and the flora examined; systematics (species, including many fungi, containing antibiotics, those which, apparently, do not contain them, and the factors affecting their production); distribution among the different organs; antibiotic activity against microbes, viruses and bacteriophages, and lower and higher plants; applications in medicine and agriculture; and conclusions.

Mikola (Peitsa). **Studies on the decomposition of forest litter by Basidiomycetes.**—*Commun. Inst. for. Finl.*, **48**, 2, pp. 1–22, 1958. [*Biol. Abstr.*, **33**, 4, p. 1205, 1959.]

From tests by pure culture methods of the ability of 26 spp. of basidiomycetes to

attack pine needle and aspen leaf litter and of *Collybia dryophila*, *Mycena clavicularis*, and *Laccaria laccata* to decompose 25 kinds of litter, it was concluded that basidiomycetes are essential for this purpose, especially in mor soils. Many soil basidiomycetes decompose ligin and cellulose. In spite of rapid decomposition, nitrogen mobilization is weak in mor humus.

Riba (R.) & Esparza (N.). **Contribución al estudio de algunas especies de Aspergilli aisladas en la República Mexicana.** [Contribution to the study of some spp. of *Aspergillus* isolated in the Republic of Mexico.]—*Bol. Soc. bot. Méx.*, **23**, pp. 10–25, 10 fig., 1958.

An historical sketch is followed by a description of the genus, and a statement on the culture media employed. Six spp. are described; 3 were found living parasitically, *A. niger* on wheat grains and a pine cone, *A. micro-virido-citrinus* on pine cones, and *A. awamori* on wheat grains.

Blagojević (M.). **Biljni paraziti i štetočine u Hercegovini u toku 1954–1956 godine.** [Plant parasites and pests in the region of Herzegovina during 1954–56.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1958*, 45, pp. 57–65, 1958. [English summary.]

This list of 49 parasitic fungi, 3 bacteria, and 5 virus diseases includes *Spongospora subterranea* on potato [map 34], *Uromyces appendiculatus* on bean [*Phaseolus vulgaris*: map 290], both severe, fig mosaic virus, tobacco Bergerac ring spot virus, and tomato big bud virus.

Moroshkovskiĭ (S. F.). Матеріали до мікофлори заповідника Стрілецкий степ. [Materials for the fungus flora of the Streletsky steppe.]—*J. Bot. Acad. Sci. Ukr.*, **15**, 2, pp. 88–95, 1958. [Russian and English summaries.]

A study in the Melovsky district, Lugano region, U.S.S.R., in 1953–56 during which 100 spp. and 11 forms were collected, including *Puccinia cichorii* on *Cichorium intybus*, *Uromyces caryophyllinus* on *Gypsophila paniculata*, *U. pisi* on *Lathyrus pratensis*, *U. striatus* on *Medicago romanica*, and *Melampsora lini* on *Linum nervosum*. Five proved new to Ukraine, including *Sphaerotheca fuliginea* on *Scabiosa ochroleuca* and *Cercosporella scorzonerae* on *Scorzonera ensifolia*, and 2 new to U.S.S.R.

Kazenas (L. D.). Список болезней сельскохозяйственных растений Казахстана. [List of diseases on agricultural plants in Kazakhstan.]—Тр. Ста. Защ. Раст. Казахск. фил. ВАСХНИЛ [*Trud. Sta. Zashch. Rast. Kazakh. fil. VASKNIL*], **3**, pp. 216–240, 1956. [Received Apr. 1959.]

The fungus, virus, and bacterial diseases (491 in all) of all the major crops in the Republic are listed with notes on their distribution locally. This list supplements 2 earlier ones in the same journal.

Gorodilova (Mme L. M.). Список болезней древесных и кустарниковых пород Казахстана. [List of diseases on trees and shrubs in Kazakhstan.]—Тр. Ста. Защ. Раст. Казахск. фил. ВАСХНИЛ [*Trud. Sta. Zashch. Rast. Kazakh. fil. VASKNIL*], **3**, pp. 241–248, 1956. [Received Apr. 1959.]

This is a list of 183 fungal, bacterial, and virus diseases, with their distribution in S.E. Kazakhstan, which were not included in an earlier list in vol. 2 of the journal. Three new species are named [without descriptions or diagnoses.]

Mujica (F.). **Determinaciones micológicas IX.** [Mycological identifications IX.]—*Agricultura téc., Santiago*, **17**, 2, pp. 106–107, 1957. [Received 1959.]

The following diseases were among those newly recorded in Chile during 1957 [cf. **37**, p. 266]: *Verticillium alboatrum* on beans (*Phaseolus vulgaris*) and *Peronospora effusa* on spinach in Santa Cruz.

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